

NASA

Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (186)
November 1978

National Aeronautics and
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STAR (N-10000 Series) N78-28043 — N78-30037

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 186)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in October 1978 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*



Scientific and Technical Information Branch

1978

National Aeronautics and Space Administration

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 159 reports, articles and other documents announced during October 1978 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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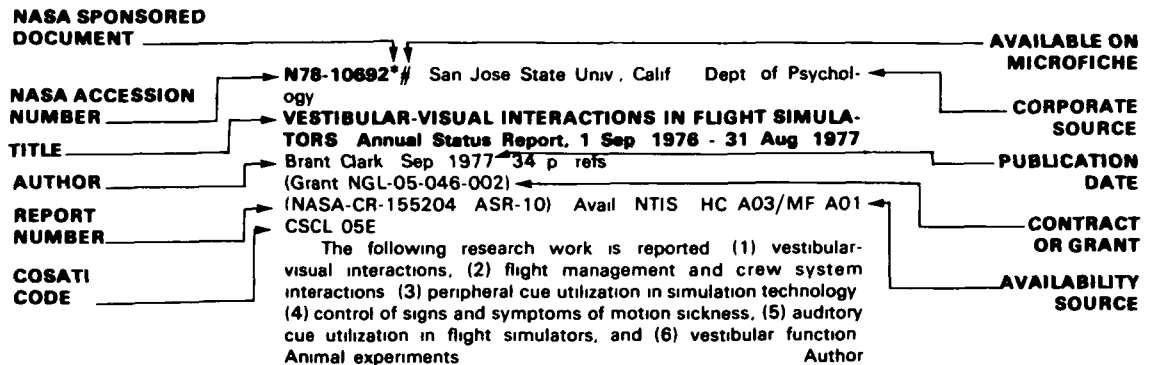
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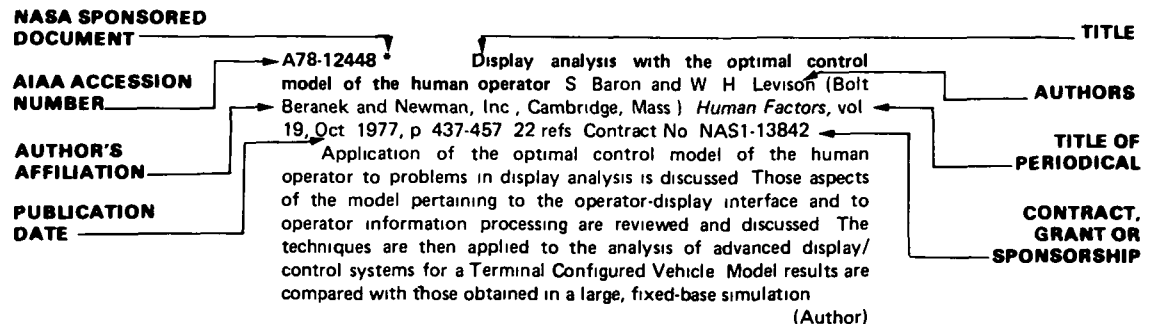
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 186)

NOVEMBER 1978

IAA ENTRIES

A78-43642 # Heat losses and body temperature of albino rats during hyperoxia (Vtrati tepla i temperatura tila bilikh shchuriv v umovakh giperoksii) V V Matsinin (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR) *Akademiia Nauk Ukrains'koi RSR, Dopovidy, Seriya B: Geologichni, Khimichni ta Biologichni Nauki*, Apr 1978, p 365-371 12 refs In Ukrainian

A78-43698 # Use of EEG in selecting candidates for flight schools (Ispol'zovanie elektroentsefalografii pri othbere kandidatov v letnye uchilishcha) V B Malkin *Voenno-Meditsinskii Zhurnal*, no 5, 1978, p 57-61 In Russian

Normal bioelectrical activity of the brain during EEG recording is divided into four types according to the characteristics of the EEG waves, especially the alpha rhythm in the occipital region under conditions of closed eyes. This EEG procedure is used to evaluate the learning capacity and flight proficiency of flight school students at admission time and during later years of study. It is shown that the highest flight proficiency is achieved by students of first-type EEG, i.e. those with a well pronounced stable alpha rhythm. In particular, patients afflicted with epilepsy and individuals with enhanced tendency to paroxysmal disorders of consciousness show earlier evidence of pathological changes on EEG than healthy subjects during simultaneous hyperventilation and EEG recording. More reliable conclusions on the functional state of the CNS can be reached by a combined EEG and psychophysiological examination. S D

A78-43747 Effect of intermittent high altitude hypoxia on the synthesis of collagenous and non-collagenous proteins of the right and left ventricular myocardium B Ostadal, E Mirejovska, J Hurych, V Pelouch, and J Prochazka (Ceskoslovenska Akademie Ved, Fyziologicky Ustav, Institut Hygieny a Epidemiologie, Prague, Czechoslovakia) *Cardiovascular Research*, vol 12, May 1978, p 303-308 36 refs

The incorporation of C-14-proline into collagenous and non collagenous proteins of the right and left ventricular myocardium was investigated in rats exposed to intermittent high altitude hypoxia. Experimental results have shown that even in control animals significant differences exist in the concentration and synthesis of individual protein fractions between the right and left ventricular myocardium. Long term exposure to intermittent high altitude hypoxia induced a significantly increased concentration of collagenous and non-collagenous proteins in both ventricles. The incorporation of C-14 proline was not affected at this period (i.e. period of stabilised hypertrophy) in either of the fractions studied. (Author)

A78-43787 Static mechanical properties of bronchi in normal excised human lungs U B S Prakash and R E Hyatt (Mayo Clinic and Mayo Foundation, Rochester, Minn.) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 45-50 23 refs Grant No NIH-HL-12229

A bronchographic investigation at transpulmonary pressures in the range 20-0 cm H₂O was carried out on 22 male and female lungs excised at autopsy and studied within 24 hr of death. The lungs were from subjects, below and above 40 years of age, who by history were free from pulmonary disease and chest trauma. The relationships between pressure and bronchial diameter, pressure and bronchial length, pressure and intrapleural length, and bronchial diameter and the cube root of lung volume were assessed. It is shown that with aging, airways (especially those no more than 2.1 mm in diameter) lose recoil, but only in males, no such age effect is observed in females with airways of any size. The younger (below 40 years of age) subjects exhibit anisotropic behavior of bronchi not seen in the older (above 40 years of age) subjects, whereas the lungs deflate in an isotropic way down to a pressure of 3 cm H₂O. S D

A78-43788 * Body mass, composition, and food intake in rabbits during altered acceleration fields M J Katovich and A H Smith (California, University, Davis, Calif.) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 51-55 24 refs Grant No NGR 50-004 008

Mature male Polish rabbits were subjected to varying gravitational fields in an animal centrifuge in order to evaluate the effects of acceleration and deceleration on body mass, body composition, and food intake. The acceleration field intensity was increased by 0.25 G increments to a maximum of 2.5 G at intervals which permitted physiological adaptation at each field. Control animals of the same age were maintained at earth gravity under identical conditions of constant-light environment at a room temperature of 23 ± or - 5 °C. It is shown that increasing the acceleration field intensity leads to a decrease in body mass. The regulated nature of this decreased body mass is tested by the response to an additional three-day fasting of animals adapted physiologically to 2.5 G. Ad libitum food intake per kg body mass per day tends to increase in chronically accelerated animals above 1.75 G. Increase in water content in centrifuged animals after physiological adaptation to 2.5 G is the result of decreasing body fat. Body mass and food intake returned to the precentrifuged levels of control animals within six weeks after cessation of centrifugation. S D

A78-43789 Comparison of metabolic and ventilatory responses of men to various lifting tasks and bicycle ergometry J S Petrofsky and A R Lind (St. Louis University, St. Louis, Mo.) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 60-63 12 refs US Department of Health, Education and Welfare Contract No CDC-00-74-83

A78-43790 Metabolic, cardiovascular, and respiratory factors in the development of fatigue in lifting tasks J S Petrofsky and A R Lind (St Louis University, St Louis, Mo) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 64-68 10 refs U S Department of Health, Education and Welfare Contract No CDC-00-74-83

Surface EMG experiments were conducted on three volunteer well-trained male subjects aged 21, 23, and 27 yr, respectively, during lifting of boxes and fatiguing isometric exercise with the aid of the back and forearm muscles for 1-4 hr The results are discussed relative to increment of heart rate, changes in arterial lactate level, changes in isometric endurance after lifting, EMG during static exercise, and four-hour workload It is concluded that above about 50% of maximal oxygen uptake, fatigue occurs as suggested by Astrand (1960) The relationship of the EMG changes during the one-hour work to the reduction of isometric endurance at the end of the lifting period indicates that analysis of surface EMG provides a viable assessment of the development of fatigue Significant fatigue in the forearm muscles is observed during prolonged lifting S D

A78-43791 Metabolic and cardiovascular adjustment to arm training J R Magel, W D McArdle, M Toner, and D J Delio (Queens College, Flushing, N Y) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 75-79 28 refs Research supported by the City University of New York Research Foundation, Contract No N00014-76-C-0192

Metabolic and cardiovascular adaptations to aerobic arm training were evaluated in seven control and nine experimental male adult subjects during arm work prior to and following 10 weeks of interval arm training The objective was to determine whether improvement in aerobic capacity after arm training was due to changes in central circulatory dynamics cardiac output and stroke volume or to more effective oxygen extraction as reflected by the arterio venous oxygen difference To further confirm the specificity of the aerobic adjustment to arm training and confirm the extent, if any, of cross-training from arms to legs, maximal oxygen uptake was also determined in treadmill exercise Lack of significant increase in maximal oxygen uptake during treadmill running following the arm training experiment confirms the specificity of the metabolic adaptation to arm training, thereby supporting the role of peripheral factors in determining the metabolic adaptation to specific exercise training Improvement in aerobic capacity following arm training is dependent on either peripheral blood flow and/or cellular metabolic capacity S D

A78-43792 Regulation of intracellular pH in lungs and other tissues during hypercapnia S C Wood and K E Schaefer (U S Naval Material Command, Submarine Medical Research Laboratory, Groton, Conn) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 115-118 26 refs

Based on a knowledge of pH dependence of most metabolic function and on an increasing awareness of important metabolic functions of the lung and kidney, the in vivo buffering capacity of these tissues are examined in comparison with cardiac muscle (ventricles), skeletal muscle (gastrocnemius) and extracellular fluid in male guinea pigs (400 600 g) of the Hartley strain housed in temperature-controlled environmental chambers during chronic hypercapnia Hypercapnia is induced by maintaining an atmosphere of 15% CO₂, 21% O₂, and 64% N₂ in the chambers Extra and intracellular adjustments to hypercapnia are quantified by two parameters (1) the apparent CO₂ buffer value, i.e., the in vivo buffer value when metabolism and exchange across membranes augments or diminishes chemical buffering, and (2) the percent pH regulation value, which is particularly suitable for in vivo conditions of pH changes due to altered CO₂ tension and is linearly related to the actual pH regulation The results are discussed relative to the important and pH-dependent metabolic functions of the lung and kidney S D

A78-43793 Carbohydrate, lipid, and amino acid metabolism following physical exercise in man G Holm, P Bjorntorp, and R Jagenburg (Sahlgren's Hospital, Goteborg, Universitet, Goteborg, Sweden) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 128-132 36 refs Research supported by the Goteborgs Universitet and Svenska Lakaresallskapet, Swedish Medical Research Council Grant No B76-19X-251-14B

A comprehensive study was carried out to assess the changes in metabolism during the period after a standardized exercise, starting when the sympathetic nervous system drive of exercise had ceased and continuing as long as the changes were measurable The subjects examined were obese and nonobese male and/or female subjects evaluated before and at different intervals after 1 hr of exercise on a bicycle ergometer at 70% of maximal working capacity The results obtained show decreases in plasma cortisol, insulin, and triglycerides during a few days following exercise, simultaneously blood glycerol is elevated These are the same changes observed after physical training, particularly in the obese subjects, where cortisol output is decreased along with plasma triglyceride and insulin concentrations The elevated glycerol levels may be the first sign of increased lipid mobilization in accordance with the well known body fat decreasing effect of physical training S D

A78-43794 Oxygen electrode design criteria and performance characteristics - Recessed cathode G Schneiderman and T K Goldstick (Northwestern University, Evanston, Ill) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 45, July 1978, p 145-154 24 refs Research supported by the Chicago Heart Association, American Heart Association and Evanston Hospital, Grants No NIH-HL-17517, No NIH-HL-01979

A computer simulation of the P(O₂) field induced by the steady-state operation of a polarographic recessed cathode in a homogeneous nonconsuming medium is developed The analysis involves the numerical solution of the Laplace equation with appropriate boundary conditions The solution is greatly simplified by the development of a new three-dimensional orthogonal coordinate system with surfaces coincident with the geometry of the problem The numerical results are used to derive convenient semianalytic equations predicting the O₂ current sensitivity, the maximum stirring artifact, and the measurement error under given conditions Accurate measurement of tissue P(O₂) by the recessed cathode requires that the recess length to recessed-cathode diameter ratio be greater than about 10 S D

A78-43923 Evoked potential evidence of adaptation to spatial Fourier components in human vision A T Smith and D A Jeffreys (Keele, University, Keele, Staffs, England) *Nature*, vol 274, July 13, 1978, p 156-158 10 refs Research supported by the Science Research Council

Evidence obtained from evoked potentials indicates that attenuation of the activity of orientation-specific cells in one region of the human visual cortex occurs largely in cells which are tuned to the orientations of the fundamental Fourier components of an adapting pattern rather than to the orientations of the edges contained in the pattern The potential studied is the initial component of the transient visual evoked potential elicited by the onset of a briefly presented pattern and recorded using electrodes attached to the scalp over the occipital lobe This component, which occurs after a latency of 75 msec, is thought to originate in the striate cortex In one experiment, the test pattern was a horizontally orientated Esquare-wave grating of spatial frequency 2.0 cycles per degree An analog plot of amplitude against latency is shown The results provide physiological evidence that visual stimuli are represented in the visual system at least partly in terms of their Fourier spectra M L

A78-43924 Perceptual effect of pursuit eye movements in the absence of a target R Ward (Quebec, Universite, Trois Rivières, Canada) and M J Morgan (Psychological Laboratory, Cambridge, England) *Nature*, vol 274, July 13, 1978, p 158, 159 18 refs

The paper describes a perceptual effect apparently created by the generation of smooth horizontal tracking eye movements, in the absence of a target, by observers regarding a display of dynamic visual noise. People watching dynamic noise ('snow') on a television monitor screen were instructed to attempt to generate smooth tracking eye movements in a horizontal direction to and fro across the display. Naive observers were aided in the early stages by moving a pencil tip across the screen and demonstrating that a small area of noise near the tip appeared to move with it. All subjects learned to produce smooth tracking after at most one or two 15-minute sessions. Explanations of this generation of tracking eye movements are considered, and it is suggested that the effect can be interpreted in terms of the presence within random visual noise of features which lead to the neuronal representation of movement at some unspecified level of organization of the visual system. M L

A78-43944 Gas exchanges during exercise in normoxia and hyperoxia. H. Gautier, D. Maillard, J. Vincent, and D. Zaoui (Faculte de Medecine Saint-Antoine, Paris, France) *Respiration Physiology*, vol. 33, May 1978, p. 199-211. 38 refs.

A comparative experimental study was conducted on five healthy subjects exercising on a bicycle ergometer at a constant workload of 90 W for 10 min under normoxic and hyperoxic conditions. The objective was to assess the effects of hyperoxia as compared to normoxia on gas exchange and metabolism during submaximal exercise, with particular reference to the relationship between O₂ deficiency, O₂ debt, and blood lactate. It is shown that despite a significant scatter in the values of O₂ deficiency and O₂ debt, these values are related to an increase in blood lactate level, which favors pronounced acidosis in both normoxia and hyperoxia. However, hyperoxia reduces both the blood lactate level and the O₂ debt, and exercise produces a slight decrease in P(O₂). The results point to the possible role of humoral factors in the regulation of ventilation during exercise. S D

A78-44009 # Increased heat production of muscular contraction after cold adaptation (Povyshenie teploproduktssii myshchynogo sokrashcheniia posle adaptatsii k kholodu). K. P. Ivanov and L. D. Pchelenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Akademiia Nauk SSSR, Doklady*, vol. 240, May 1, 1978, p. 227-230. 8 refs. In Russian.

An experiment was performed on the isolated diaphragm muscles of cold-adapted male albino rats. Direct evidence was found of a specific increase in the heat production of muscular contraction under the influence of noradrenaline in cold-adapted animals. This indicates that, after adaptation to cold, noradrenaline regulates the heat balance of contractions and can produce a sharp increase in the efficiency of thermoregulatory forms of muscular activity. It follows that muscular contraction is a source of increased heat production even after long-term adaptation to cold. B J

A78-44018 # Phycobilins of blue-green algae in connection with the problem of the origin and evolution of life on earth (Fikobiliny sinezelenykh vodoroslei v svyazi s problemoi proiskhozhdeniia i evoliutsii zhizni na zemle). M. P. Kolesnikov and I. A. Egorov (Akademiia Nauk SSSR, Institut Biokhimi, Moscow, USSR) *Akademiia Nauk SSSR, Doklady*, vol. 240, May 11, 1978, p. 474-477. 13 refs. In Russian.

Absorption spectroscopy and high resolution proton magnetic resonance spectroscopy were used to investigate the nature and thermal stability of the pigment, phycobilin 655, in several types of blue-green algae, comprising *Spirulina platensis*, *Phormidium uncinatum*, and *Mastigocladus laminosus*. The results confirm that phycobilins found in precambrian sediments belong to the group of linear tetrapyrrole compounds. The algal nature of the pigment is supported by the fact that the sedimentation under consideration occurred in shallow sea basins, possibly containing blue-green algae, the oldest photosynthesizing organisms on earth. B J

A78-44090 # Contractile function of the myocardium and energy supply during experimental hyperfunction of the heart in animals of different age (Sokratitel'naiia funktsiia miokarda i ee energeticheskoe obespechenie pri eksperimental'noi giperfunktsii serdtsa u zhivotnykh raznogo vozrasta). V. G. Shevchuk and T. N. Kozinets (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal*, vol. 24, May-June 1978, p. 291-296. 11 refs. In Russian.

Experiments were conducted on adult (6-8 months old) and old (24-26 months old) white rats with myocardial hyperfunction induced by coarctation of the aorta. The objective was to evaluate the functional and metabolic behaviors of the heart in these two groups under myocardial hyperfunction. It is found that the old animals exhibit a decrease in the contractile function, hemodynamics, and energy metabolism of the myocardium. Increased loading of the heart by aortal coarctation produces negligible changes in the function and energetics of the myocardium in the young group, whereas the old group shows symptoms of cardiac insufficiency. In the stage of relatively stable cardiac hyperfunction, the young group shows enhanced indices of myocardial contraction, while in the old group they are maintained at their initial levels. S D

A78-44091 # Dynamics of heart contractions in dogs with experimental renal hypertension under hypoxic hypoxia conditions (Dinamika serdechnykh sokrashchenii u sobak s eksperimental'noi pochechnoi gipertoniei v usloviakh gipoksicheskoi gipoksii). T. Mansurov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal*, vol. 24, May-June 1978, p. 312-320. 38 refs. In Russian.

A78-44092 # Investigation of the activity of isocitrate dehydrogenase and malate dehydrogenase in tissues of rats with different resistance to acute hypoxic hypoxia (Issledovanie aktivnosti izotsitratdehidrogenazy i malatdehidrogenazy v tkaniakh krysa s razlichnoi ustoiichivost'iu k ostroi gipoksicheskoi gipoksii). A. I. Nazarenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal*, vol. 24, May-June 1978, p. 348-352. 22 refs. In Russian.

A78-44093 # Participation of erythrocytes in blood coagulation and fibrinolysis in healthy man (Uchastie intaktnykh eritrotsitov v protsessakh gemokoagulatsii i fibrinoliza u zdorovykh ludei). L. P. Musienko (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal*, vol. 24, May-June 1978, p. 378-386. 40 refs. In Russian.

A78-44094 # A method for recording transient processes in the cardiac rhythm and its implementation (Metod registratsii perekhodnykh protsessov v ritme serdechnykh sokrashchenii i ego realizatsiia). A. N. Lebed' and V. P. Didenko (Voroshilovgradskii Meditsinskii Institut, Voroshilovgrad, Ukrainian SSR) *Fiziologicheskii Zhurnal*, vol. 24, May-June 1978, p. 418-420. In Russian.

A technique for recording a transient process in the rhythm of cardiac contractions is proposed, which consists of counting during short periods of time (30-60 sec) the number of intervals between cardiac contractions, whose duration is larger or smaller than the intervals determining the limit of variability of the cardiac rhythm. Thus, the technique permits recording suitable curves on the basis of the data collected during physical stress and breath holding. The technique is implemented by using a special-purpose attachment to a pulsotachometer, whose circuit diagram is presented and briefly described. The curves recorded during physical stress and breath holding show that the proposed technique yields information on the duration of a transient process, on its character, and on the magnitude of cardiac-rhythm disturbance. S D

A78-44131 * Simulator evaluation of three situation and guidance displays for V/STOL aircraft zero-zero landing approaches M R Murphy, E A Palmer, T E Wempe (NASA, Ames Research Center, Man Vehicle Systems Research Div, Moffett Field, Calif), L A McGee, and C H Paulk (NASA, Ames Research Center, Flight Systems Research Div, Moffett Field, Calif) *IEEE Transactions on Systems, Man, and Cybernetics*, vol SMC 8, July 1978, p 563 571 5 refs

A simulator study was undertaken to compare and evaluate the design features of the electronic displays for possible use in V/STOL aircraft a combined transition display (Display A), a perspective display (Display B), and a hover display (Display C) Display B presents height information via integrated elements, Displays A and C present information similarly except that Display C presents vertical and lateral guidance via conventional cross pointers High pilot work load was attained by evaluating the displays only as situational guidance displays in a simulated vehicle without stability augmentation Glide slopes of 6 and 15 deg were used, and steady state and no wind conditions were randomly presented Six pilots participated, and fifty five objective performance measures were taken along with pilot opinions P T H

A78-44215 # Role of baroreceptors in cardiac-rhythm regulation in awake animals (Rol' baroretseptorov v regulatsii serdechnogo ritma u bodrstvuiushchikh zhivotnykh) M F Bravkov and B G Bershadskii (I Leningradskii Meditsinskii Institut, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, Apr 1978, p 475-482 8 refs In Russian

The drug mezonat was used to increase the arterial blood pressure in 12 awake cats, and three patterns of heart rate change were found Nine animals showed the typical bradycardia pattern, two showed a more rapid establishment of a more marked pulse interval, and one showed an increase in the pulse interval only in the region of highest arterial blood pressure A linear correlation between the change in the pulse interval and the increase in the arterial pressure is analyzed, and the pressure reflex-regulated heart rate responses in awake and in anesthetized animals are compared The nembatal inhibits baroreceptor regulation The results are discussed with reference to the effects caused by the vagus nerve M L

A78-44216 # The adaptation and the loss of adaptation of the myocardium of rats accustomed to hypoxia (Adaptatsiia i dizadaptatsiia miokarda krysa, trenirovannykh gipoksiei) A M Alaverdian, V P Nuzhnyi, M I Klibaner, and N N Beskrovnova (I Moskovskii Meditsinskii Institut, Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, Apr 1978, p 483 490 19 refs In Russian

A78-44217 # Metabolic characteristics of rapidly and slowly developing fatigue (Metabolicheskaia kharakteristika bystro i medlenno razvivaiushchegosia utomleniia) L S Batuner and N N Iakovlev (Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, Apr 1978, p 528-537 21 refs In Russian

The effects on albino rats of slow exhaustion (caused by 10 hours of swimming) and rapid exhaustion (caused by 4 minutes of swimming with weights, or by 5 minutes of jumping with weights) was studied The biochemical changes associated with contraction and relaxation of muscles are practically the same for the two cases Differences were found with respect to biochemical homeostasis (lactate, pyruvate, urea), potential ATP resynthesis (creatine phosphate, activity of the oxidation cycle enzymes), and the energy potential of the organism (liver and muscle glycogen, the enzymes responsible for its metabolism) Differences in these parameters during recovery after rapid or slow exhaustion were investigated M L

A78-44218 # Heat production in isolated skeletal muscles from albino rats adapting to cold (Teploproduksiia izolirovannykh skeletnykh myshts belykh krysa pri akklimatsii k kholodu) V I Sobolev (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, Apr 1978, p 543 549 13 refs In Russian

A78-44275 # Comparison of ontogenetic differences in the activity of mediatory-exchange ferments /monoamine oxydase and glutamate decarboxylase/ in the mitochondrial fractions of the cortical and hypothalamic regions (Zistavlennia ontogenetichnikh vidmin aktivnosti fermentiv mediatorного obminu /monoaminoksidazi ta glutamatdekarboksilazi/ u mitokhondrial'nikh fraktsiiaakh kori velikikh pivkul'i gipotalamichnoi oblasti) E A Gondienko and L O Zhubrikova (Kharkivs'kii Derzhavnyi Universitet, Kharkov, Ukrainian SSR) *Akademiia Nauk Ukrain's'koi RSR, Dopovidi, Seriya B Geologichni, Khimichni ta Biologichni Nauki*, May 1978, p 441-445 15 refs In Ukrainian

A78-44348 # Total cholesterol and high density lipoprotein cholesterol /H D L ch / in serum of aged pilots for predicting atherosclerotic diseases H Osada, I Sakurai, T Sakaguchi, E Sakaguchi, and R Yurugi (Japan Air Self Defense Force, Aeromedical Laboratory, Tachikawa, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 18, Dec 1977, p 119-125 8 refs In Japanese, with abstract in English

A78-44349 # The analysis of aviation training evaluations V - Factor analysis of flight aptitude test and comparison with the previous report M Okaue and K Niwa (Japan Air Self Defense Force, Aeromedical Laboratory, Tachikawa, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 18, Dec 1977, p 127-135 5 refs In Japanese, with abstract in English

A Flying Aptitude Test (APT) conducted by the Japanese air force is evaluated in terms of 27 items relating to a person's fitness for flight Among the items considered are flying ability, general mental and physical tendencies, physical fitness, resolution and leadership, motivation, and ability to cooperate with others APT is compared with results obtained from a similar study conducted in 1974 D M W

A78-44350 # Several factors of designing multi-channel ECG pre-amplifier for human centrifuge experiment and performance of tentatively manufactured equipment M Ono (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 18, Dec 1977, p 137-149 15 refs In Japanese, with abstract in English

A multichannel ECG pre-amplifier for use with a human centrifuge is evaluated in terms of error sources resulting from the operation of the centrifuge itself It is noted that most of the equipment tested performed satisfactorily D M W

A78-44500 Manual optimization of ill-structured problems J R Buck (Purdue University, West Lafayette, Ind) and W M Hancock (Michigan, University, Ann Arbor, Mich) *International Journal of Man-Machine Studies*, vol 10, Mar 1978, p 95 111 41 refs

This paper describes an empirical study on human operators optimizing ill-structured problems over a variety of problem conditions Performance and exploratory characteristics of the operators were examined as a function of these conditions relative to the random automatic optimization method Manual optimization performance exceeded that of the automatic method under most conditions In those problems containing more controls to be optimized and where there were few trials available, manual optimization was far more effective Operator performance was impaired in solving problems which contained noise in the reported pay-off Exploratory characteristics of these operators changed with the problem conditions Based upon these characteristics, manual

optimization may be described as a low-order gradient optimizer with adaptation to different problem conditions (Author)

A78-44621 Life sciences research in Spacelab G Wirths *Dornier-Post* (English Edition), no 2, 1978, p 59 61

The European Spacelab Biorack for biological and medical experiments is described It will consist of a standard rack with drawers for experiments on (1) the effects of zero gravity and radiation on growth and metabolism of cells and tissues, (2) the effects of zero gravity on germination, growth, and biological rhythms of plants, and (3) the effects of zero gravity and hard radiation on behavior and development of low vertebrates Two special units for these studies are the fish incubator and the frog incubator General design of these units is discussed P T H

A78-44697 Oxygen system maintenance guide SAE *Aero-space Information Report*, AIR 1392, Oct 1977 4 p

Specific safety procedures designed to minimize the dangers involved with the use and maintenance of oxygen aboard aircraft are reviewed It is noted that the cleanliness of the equipment is an important factor, as well as adequate clearance between oxygen equipment and electrical and heating systems Attention is given to torque requirements for both pipe and flared tube connections D M W

A78-45077 * Visual phenomena induced by relativistic carbon ions with and without Cerenkov radiation P J McNulty, V P Pease (Clarkson College of Technology, Potsdam, N Y), and V P Bond (Brookhaven National Laboratory, Upton, N Y) *Science*, vol 201, July 28, 1978, p 341-343 8 refs Grant No NsG-9059

Exposing the human eye to individual carbon ions moving at relativistic speeds results in visual phenomena that include point flashes, streaks, and larger diffuse flashes The diffuse flashes have previously been observed by astronauts in space but not in laboratory experiments with particles of high atomic number and energy They are observed only when the nucleus moves fast enough to generate Cerenkov radiation (Author)

A78-45224 # Cardiac rhythm diagnosis by digital computer H W M Plokker Utrecht, Institute of Medical Physics TNO, 1978 188 p 118 refs

The theoretical basis for a computerized analysis of cardiac rhythm diagnosis is presented in terms of the parameters of normal and irregular rhythm for patients of varying conditions of health Attention is given to the hardware and software used in evaluating specific cardiac wave function, e g, the TNO modular ECG/VCG interpretation system, computerized criteria for wave polarity, and diagnostic logic D M W

A78-45272 # Discrete time pilot model. D Cavalli (ONERA, Châtillon-sous Bagneux, Hauts-de-Seine, France) *Annual Conference on Manual Control, 14th, Los Angeles, Calif, Apr 25-27, 1978* J ONERA, TP no 1978 60, 1978 11 p 17 refs

A model of pilot behavior is developed on the basis of mathematical and psychological approaches and the introduction of an aircraft internal model The pilot's behavior is viewed as a discrete-time process and the decision making as a sequential process The decision center operates via three action loops outer loops controlling short term safety (flight path, speed, position), loops controlling immediate safety (angle of attack), and inner loops controlling forces applied to the controls A control law, ensuring immediate and short-term safety, is used as a guide-line It is set by the pilot and his or her ability to adapt to flight-phase conditions The model has been used to simulate the final descent of the ILS approach of an Airbus A-300B S C S

A78-45320 # Bioengineering approach to the study of mechanisms of coding of external stimuli in the human retina and the role of these mechanisms in the visual process (Biotehnicheskii podkhod

k issledovaniyu mekhanizmov kodirovaniya vneshnego stimula v setchatke glaza cheloveka i ikh rol' v zritel'nom protsesse) V F Ananin *Problemy Bioniki*, no 18, 1977, p 61-70 14 refs In Russian

A78-45397 Visual-field displacements in human beings evoked by acoustical transients D E Parker, R L Tubbs, and V M Littlefield (Miami University, Oxford, Ohio) *Acoustical Society of America, Journal*, vol 63, June 1978, p 1912-1918 21 refs USAF-supported research

Sixty-two of 133 subjects reported visual-field displacements when they were exposed to intense (125 dB SPL) repetitive audiofrequency transients This phenomenon was investigated in three experiments Frequency (100-5000 Hz) was varied in experiment I, repetition rate (0.5/s-6.0/s) was varied in experiment II, acoustical transient onset/offset time (0.2-2.5 ms) was examined in experiment III The results of these three experiments indicated that the largest proportion of displacement reports and the largest perceived motion magnitudes followed stimulation in the 500- to 1000-Hz frequency range at repetition rates of about 1/s Response differences as a function of onset/offset time were erratic The pattern of results obtained in this study, in conjunction with the results of previous investigations of acoustical vestibular stimulation, suggests that the visual-field displacements resulted from stimulation of the receptors of the vestibular system (Author)

A78-45409 Electrophysiologic properties of alcohol in man. L Gould, C V R Reddy, W Becker, K C Oh, and S G Kim (Methodist Hospital, Brooklyn, N Y) *Journal of Electrocardiology*, vol 11, July 1978, p 219-226 28 refs

His bundle electrograms are recorded in 14 male and female nonalcoholic patients (aged 43-90 yr) with organic heart disease before and after oral ingestion of 2 oz of 87 proof whiskey in order to assess the effects of alcohol on the human conduction system Electrode catheters are percutaneously introduced and fluoroscopically positioned in appropriate heart regions to measure intra atrial contraction, A-V node conduction, intraventricular conduction, retrograde refractory periods, and automaticity and recovery periods of the sinus node Blood pressure and standard three-lead EEG are also obtained A discussion of the results reveals that a small amount of acutely administered alcohol has a complex action on the human conduction system It delays conduction at the atrial level, improves conduction through the A V node, and shortens the effective refractory period of the ventricular myocardium S D

A78-45438 * # Research in pilot scanning behavior M C Waller (NASA, Langley Research Center, Hampton, Va) *National Technical Association, Annual Convention, 50th, New York, N Y, Aug 2-5, 1978, Paper* 10 p 5 refs

A NASA developed oculometer, which measures pilot scanning behavior, is described in terms of design and operating parameters Results are presented of tests conducted in a terminal configured vehicle (TVC) aft cockpit simulator, involving pilots making simulated instrument approaches Attention is given to the amount of time the pilots spend scanning the SFD and EADI CRT displays, and to differences resulting from both the physical location of the CRTs (within a 30 x 30 x 30 cm space), and from their intrinsic characteristics D M W

A78-45504 Health effects of noise exposure V J Krichagin (World Health Organization, Copenhagen, Denmark) *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 65-71 15 refs

The paper surveys a number of studies carried out with the aim of detecting the influence of community noise on the health of chronically exposed population groups Various correlations between health factors and long-term exposure to urban noise of different kinds at different levels are pointed out Different approaches to determining the proper method of quantifying noise doses are mentioned The nonauditory physiological effects of noise are emphasized P T H

A78-45505 Review of animal experiments A Moller (Sahlgrenska Hospital, Goteborg, Sweden) *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 73-77 9 refs

The paper discusses some results of animal experiments in which various effects of noise on bodily functions other than hearing were studied. These reactions are believed to be mediated via the vegetative nervous system. Studies of effects of noise on rats showed that short interruptions in an otherwise continuous noise give rise to a very strong vasoconstriction. Noise was found to have different acute effects in mice, rats, and guinea pigs, although short noise exposures did not give rise to excessive adrenocortical activity. High-frequency sound seems to cause a breakdown of normal endocrine defense mechanisms in some animals. Long-term experiments indicate that hypertensive rats may acquire their hypertension slightly earlier when exposed to 105 dB noise than they do in a relatively noise-free environment P T H

A78-45506 Medical effects of environmental noise on humans U Ahrlin and E Ohrstrom (Goteborg, Universitet, Goteborg, Sweden) *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 79-87 58 refs

The paper discusses some of the nonspecific effects of noise exposure in animals and man. This rules out such specific effects as hearing damage, and concentrates on the temporary and persisting physiological responses. The main temporary effect is the startle response accompanied by accelerated heart beat, increased blood pressure, reduced salivation, changes in white blood cell pattern, and other symptoms, none of which can be used as a criterion for identifying the effects of long-term noise exposure. A major persisting nonspecific response is chronically elevated blood pressure in persons subjected to continued noise exposure. Various studies have indicated relations between chronic noise exposure and mental disorders, though nothing conclusive is available P T H

A78-45507 Effects of aircraft noise on mental health A Tarnopolsky (Institute of Psychiatry, London, England) *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 89-97 27 refs. Research supported by the Medical Research Council and Foundation's Fund for Research in Psychiatry

The paper discusses various studies conducted on the relationship between exposure to aircraft noise and community mental health. One study investigated the relation between degree of annoyance and mental health measures of two population samples exposed to different levels of aircraft noise. One population lived within two kilometers of a large airport, the other lived 30 km away. The people in the area close to the airport reported that aircraft noise was the biggest nuisance in their area, while for those far away noise was not considered the biggest nuisance. No positive evidence of a relation between the percentage of positive General Health Questionnaire scores and noise exposure has been found. An association does exist between annoyance and probable psychiatric cases P T H

A78-45508 Noise-induced sleep disturbances and their effects on health B Griefahn (Mainz Universitat, Mainz, West Germany) and A Muzet (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France) *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 99-106 54 refs

A78-45509 Defensive activation toward noise R Guski *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 107-110 11 refs

Long lasting sounds cause physiological reactions referred to as 'ergotropic', 'orienting' or 'defensive' reactions, the components of which have been demonstrated in laboratory experiments. In a study of residents exposed to aircraft noise in Germany, about 400 subjects were given white noise exposures of 85 and 100 dB in the laboratory. About 70% demonstrated vasoconstriction at the finger tips and temple, increase in muscle activity, initial deceleration of the heart

rate and increase in tracking error and bodily movements. The number and degree of these reactions to laboratory noise increase with the number and loudness of aircraft movements at the homes of the subjects (Author)

A78-45510 Continuing studies of noise and cardiovascular function E Peterson, J S Augenstein, and D C Tanis (Miami, University, Miami, Fla) *Journal of Sound and Vibration*, vol 59, July 8, 1978, p 123-129 21 refs

Long term trends in heart rate were observed in a free moving rhesus monkey. Initially, normal heart rate for the animal was defined over a span of 4 months. She was then exposed to a community noise recording 12 hours per day for 7 weeks. Pre- and post-exposure changes were noted in several aspects of cardiac function. During the exposure period, heart rate and proportion of aberrant EKG responses rose significantly above, then fell significantly below, baseline levels. Patterns of diurnal rhythm for early morning heart rate were also altered by noise exposure. These last results are consistent with those of an earlier study in which a restrained animal was subjected to similar stimulus conditions. The after effects of the single, prolonged noise exposure episode have dissipated gradually. During the course of a 4 month post exposure period, heart rate and proportion of aberrant EKG responses have slowly returned to near baseline levels. Early morning diurnal rhythm for heart rate has not yet returned to its pre exposure pattern (Author)

A78-45885 # Choosing ESA's first astronaut D J Shapland (ESA, Spacelab Directorate, Paris, France), J de Waard (Spacelab Payload Integration and Co operation in Europe, Porz-Wahn, West Germany), and G Nichols (ESA, Personnel Dept, Paris, France) *ESA Bulletin*, no 13, May 1978, p 21-26

The selection procedure for choosing four candidates for the payload specialist position aboard the first Shuttle-Spacelab is described. The payload specialist position represents the first opportunity for a citizen of the ESA member states to participate in a manned space venture. The payload specialist together with a U S colleague will be responsible for the operation of some 70 experiments. Psychological and medical testing procedures are briefly characterized, and short biographies of the four selected candidates are presented. In mid-1978 their number is to be reduced to three who will be trained M L

A78-45948 Human performance comparisons between digital pursuit and compensatory control T O Kvalseth (Norges Tekniske Hogskole, Trondheim, Norway) *Ergonomics*, vol 21, June 1978, p 419-425 8 refs

This experimental study compared human performance for pursuit and compensatory digital displays utilized in a digital control task with a first-order controlled system and a reference input that was either a purely random Gaussian noise or a first-order autoregressive process. The results for eight subjects showed that there were no significant differences between either the mean or the rms error performances for the two types of displays. The control errors, which were generally normally distributed with predominantly negative means, were clearly more pronounced when (a) the reference input was purely random than when it was a first order autoregressive process (with parameter $\alpha = 0.95$), and (b) the variance of the reference input was high (Author)

A78-45950 Human factors in airfield air traffic control R B Stammers (Aston, University, Birmingham, England) *Ergonomics*, vol 21, June 1978, p 483-488 10 refs. Research supported by the Civil Aviation Authority of England

The area of airfield air traffic control is briefly introduced, and potential increases in demands outlined. The tasks involved are described as an initial approach to the problem of developing improved systems. The various methods of information collection and organization for such tasks are discussed. Possible future developments in systems are mentioned together with their associated ergonomics aspects (Author)

A78-45987 # Blood flow speed in microvessels of skeletal muscle (Skorost' krovotoka v mikrososudakh skeletnykh myshts) Iu I Levkovich, M K Kalinina, K P Ivanov, and G P Mikhailova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Akademiia Nauk SSSR, Doklady*, vol 240, June 1, 1978, p 1000-1003 8 refs In Russian

In vivo studies of the capillary network of skeletal muscle in albino rats were carried out and the speed of blood flow was measured in various muscular microvessels during rest. The studies involved the use of motion pictures and a special optical system with contact epiobjective lens. The blood flow speed in the capillaries on the average did not exceed 1000 microns/sec. In the finest arterioles and precapillaries the speed was about twice as great. P T H

A78-45988 # Characterization and study of the mechanism of the thymus factor /thymarine/ (Kharakteristika i izuchenie mekhanizma deistviia faktora timusa /timarina/) V G Morozov and V Kh Khavinson (Voenno Meditsinskaiia Akademiia, Leningrad, USSR) *Akademiia Nauk SSSR, Doklady*, vol 240, June 1, 1978, p 1004-1007 13 refs In Russian

The chemical composition, biological activity, and mechanism of action of the thymus factor thymarine were investigated. The effect of thymarine extracted from the calf's thymus on the T and B-immunity systems, the immune response, and lymphoid population cells in vitro was studied. The effect of the thymus factor on the immune response to thymus dependent antigen was studied in mice. Changes in karyocytes, T and B lymphocytes under the influence of the thymus factor were studied in guinea pigs. The results of these studies enabled drawing up a characterization of thymarine in terms of (1) composition and main physico-chemical properties, (2) effect on the immunocompetent system, and (3) effect on organism system and functions depending on state of T-system and immunity. P T H

A78-46082 Construction and investigation of an information model of the process of approach of piloted spacecraft I P Meshcheriakov and S A Minaev (*Kosmicheskie Issledovaniia*, vol 15, Nov-Dec 1977, p 937-940) *Cosmic Research*, vol 15, no 6, May 1978, p 804-807 6 refs Translation

A78-46291 # Fifty minutes of submerged weightlessness (Piat' desiat minut v gidronevesomosti) A Khorobrykh *Aviatsiia i Kosmonavtika*, June 1978, p 36, 37 In Russian

The paper describes in the form of a narrative a typical training session in an underwater test facility where crew members in diving equipment handle parts of a submerged model of an orbital space station in order to simulate weightlessness. Training in hatch operations and in docking operations can be carried out. P T H

A78-46323 Human reliability engineering H Kragt (Eindhoven, Technische Hogeschool, Eindhoven, Netherlands) *IEEE Transactions on Reliability*, vol R-27, Aug 1978, p 195-201 28 refs

Man-machine systems are considered in terms of errors caused by human factors, and contrasted with those caused by 'unavoidable' situations. Attention is given to the reduction of human errors by training, discipline, systems design, and the ability to learn from past mistakes. D M W

A78-46405 Effects of hypocapnia on psychomotor and intellectual performance T M Gibson (RAF, Institute of Aviation Medicine, Farnborough, Hants, England) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 943-946 22 refs

Nine subjects performed five psychomotor tasks (two motor, two intellectual, and one combined motor and short-term memory) at three levels of PACO₂ (38.5, 25.0 and 15.0 torr) with voluntary hyperventilation at 20 l/min. There were no performance decrements at PACO₂ levels of 38.5 and 25.0 torr. At a PACO₂ of 15.0 torr, there were no decrements of intellectual performance but there were

highly significant decrements in motor performance. It is suggested that a lack of regional cerebral hypoxia, arising from compensating changes in regional cerebral blood flow, could be responsible for the preservation of intellectual performance at a PACO₂ of 15 torr.

(Author)

A78-46406 Disorientation training in FAA-certificated flight and ground schools - A survey W E Collins, A H Hasbrook, A O Lennon, and D J Gay (FAA, Civil Aeromedical Institute, Oklahoma City, Okla) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 947-951 12 refs

A 10-item, voluntary questionnaire answered by 674 flight and ground schools provided information on (1) the conduct of formal instruction about disorientation, (2) the occurrence and content of lectures on disorientation, (3) use of on-the-ground demonstrations of disorientation, (4) use of in-the-air demonstrations of disorientation, (5) use of films on pilot vertigo, (6) amount of instrument flying training students receive, (7) amount of instrument flying training required of flight instructors to maintain their proficiency, (8) adequacy of the schools' programs on disorientation training, (9) other comments, and (10) numerical data regarding the number of students beginning and completing various flight and/or ground school courses. More than one-third of the respondents evaluated their disorientation training program as inadequate and defined the inadequacy most often as a lack of appropriate materials, aids, and information. Tabulations of responses to the separate items suggested areas for improvement in disorientation training. Recommendations were made. (Author)

A78-46407 Haematologic changes in rabbits during acclimatisation, deacclimatisation, and reinduction to hypoxia S C Jain, M S Malhotra, B Krishna, J Bardhan, and A Grover (Defence Institute of Physiology and Allied Sciences, Delhi, India) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 952-955 25 refs

A78-46408 Blood flow in rat brain during exposure to high oxygen pressure D Torbati, D Parolia, and S Lavy (Jerusalem, Hebrew University, Jerusalem, Israel) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 963-967 12 refs

A78-46409 Changes in EEG pattern during acclimatization to high altitude /3500 m/ in man W Selvamurthy, R K Saxena, N Krishnamurthy, M S Malhotra (Defence Institute of Physiology and Allied Sciences, Delhi, India), and M L Suri (Defence Institute of Physiology and Allied Sciences, Army Hospital, Delhi, India) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 968-971 18 refs

A study was conducted on 30 healthy soldiers to observe EEG changes during acclimatization to high altitude. Of these subjects, 10 were lowlanders, 10 were acclimatized lowlanders and 10 were high altitude natives. They were air-lifted to an altitude of 3500 m, where periodic recordings of EEG were made for four weeks. The major conclusion of the study is that there is cerebral cortical synchronization in the initial phase of induction to high altitude, mainly due to hypocapnia. In the latter part of the first week of induction, there is cortical desynchronization as a result of sympathetic hyperactivity. During acclimatization, there is a gradual buildup of EEG waves due to relaxation of sympathetics with simultaneous buildup of parasympathetic tone. B J

A78-46410 Use of vectorcardiography for the detection of +Gz-related cardiac pathology in miniature swine M H Laughlin, W M Witt, and W F MacKenzie (USAF, School of Aerospace Medicine, Brooks AFB, Tex) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 972-975 5 refs

Vectorcardiograms were recorded from anesthetized, adult miniature swine 1-2 weeks before high sustained +Gz exposure and 2-6 h after exposure. Each +Gz run consisted of one 60-s exposure, respectively, to 3, 5, 7, and 9 +Gz, with 3 min rest between each +Gz

plateau. The full range, from severe to minor, of +Gz-induced cardiac pathology was observed in this group of miniature swine. In spite of the large variation in the amount and degree of cardiac pathology, there were no post-exposure vectorcardiographic changes which might be diagnostic of +Gz induced cardiac pathology. The results of this study indicate that vectorcardiography, performed after +Gz exposure, is not a reliable technique for detecting the presence of +Gz induced cardiac pathology in miniature swine. (Author)

A78-46411 Cold-induced vasodilatation response at different water bath temperatures in monkeys. L. Mathew, S. S. Purkayastha, and M. S. Malhotra (Defence Institute of Physiology and Allied Sciences, Delhi, India) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 976-979. 16 refs

A78-46412 Effects of hyperbaric oxygen and glutathione on mammalian liver metabolism. D. A. Baeyens and M. J. Meier (Arkansas, University, Little Rock, Ark.) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 980-983. 14 refs

A78-46413 Effects of increased ambient CO₂ on brain tissue oxygenation and performance in the hypoxic rhesus. A. A. Karl, G. R. McMillan, S. L. Ward, A. T. Kissen, and M. E. Souder (Systems Research Laboratories, Inc., Dayton, USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio) (*Aerospace Medical Association, Annual Meeting, Las Vegas, Nev., May 9-12, 1977*) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 984-989. 28 refs. Contract No. F33615-76-C-5001

Alterations of cerebral gas tensions and performance in response to hypoxia, with or without 5% CO₂ in the ambient inspire, were studied in eight conscious rhesus monkeys. The animals were trained to perform a lever press (Sidman) avoidance task. Physiological and performance data were obtained during exposures to normal (21% O₂) and hypoxic (12, 10, and 8% O₂ - all with N₂ balance) breathing atmospheres, with or without the addition of 5% CO₂. With hypoxia, cerebral PO₂ and PCO₂ declined steadily, but a significant performance decrement was noted only at the 8% O₂ level. With the addition of 5% CO₂ to the inspired atmospheres, cerebral PO₂ was elevated relatively but still declined as hypoxia intensified. Cerebral PCO₂ and the avoidance task performance were sustained at near baseline values with the 5% CO₂ inspire. (Author)

A78-46414 * Effect of dehydration on erythropoiesis in mice - Relevance to the 'anemia' of space flight. C. D. R. Dunn (Tennessee, University, Memorial Research Center, Knoxville, Tenn.) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 990-993. 30 refs. Contract No. NAS9-15164

Mice deprived of water for 24 h showed an increase in hematocrit and loss of body weight comparable to that seen in men during space flight. The increase in hematocrit was entirely due to a decrease in plasma volume and was associated with suppression of erythropoiesis, but with no significant change in the serum titer of a presumptive humoral regulator of erythropoiesis, Erythroid Stimulating Activity (ESA). Mice deprived of water for 24 h may be a useful model for the study of the early hematological effects of space flight. The suppression of erythropoiesis due to a relative erythrocytosis appears to be independent of ESA. (Author)

A78-46415 Operational characteristics of liquid-conditioned suits. M. H. Harrison and A. J. Belyavin (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 994-1003. 32 refs

Data from several studies of liquid-conditioned suits carried out over a period of 12 years are analyzed and used to describe the characteristics of personal liquid-conditioning systems in terms of interactions between the conditioning and the conditioned system. It is shown that the potential of a liquid-conditioning system for personal cooling and heating is determined primarily by the inlet temperature of the conditioning liquid. However, limitations are imposed upon the theoretical heat exchange capacity of the system

by skin temperature, and by the effects of excessively high and low skin temperatures on core temperature. It is suggested that mean skin temperature should not fall below 30°C when a liquid-conditioning system is used for personal cooling. Mean skin temperature should not rise to levels sufficient to cause an increase in deep body temperature. B. J.

A78-46416 Medical evaluation of G-sensitive aircrewmembers. J. E. Whinnery and M. R. Gondek (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) *Aviation, Space, and Environmental Medicine*, vol 49, Aug 1978, p 1009-1013. 10 refs

The specific causes of loss of consciousness in flight were reviewed with emphasis on the effect of high +Gz. An interesting case of loss of consciousness in flight due to the improper performance of an M-1 straining maneuver is described, demonstrating the use of the centrifuge both as a diagnostic tool and as a training device. It is recommended that centrifuge testing of specific aircrew with medical abnormalities be continued after thorough clinical evaluation is completed. In addition, consideration should be given to using the centrifuge early in aircrew training and in assuring that all instructor pilots are competent in the performance and instruction of straining maneuvers for maximum G-protection. B. J.

A78-46451 # Functional stability of cerebral circulation (Funktional'naya ustoychivost' sistemy mozgovogo krovoobrashcheniya) lu E. Moskalenko (Akademiya Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimi, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, May 1978, p 589-596. 22 refs. In Russian

Available data on the functional stability of cerebral circulation regarded as a cerebrovascular system are examined. This functional stability appears to be based on active mechanisms and on mechanisms related to the biophysical structure of the system considered. A systems approach is used to formulate the functional diagram of the regulatory influences on cerebral vessels. It is shown that the concept of functional stability is not identical to the concept of self-regulation of cerebral circulation. Available evidence suggests that the mechanism of active reactions of cerebral vessels involves primarily a neurogenic component with participation of central neural structures localized mainly in the medulla oblongata. S. D.

A78-46452 # Relationships between central and local mechanisms for regulation of hemodynamics (O sootnosheniakh tsentral'nykh i mestnykh mekhanizmov regulatsii gemodinamiki) M. I. Gurevich (Akademiya Nauk Ukrainy SSR, Institut Fiziologii, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, May 1978, p 598-606. 30 refs. In Russian

Comprehensive quantitative experiments were conducted on anesthetized cats and rabbits in order to elucidate the relationships between central and local mechanisms responsible for hemodynamic control of the cardiovascular system. The discussion concerns the bulbar level of hemodynamic regulation, the relation between the cerebellum and the medullary level of hemodynamic regulation, and the integrative mechanisms for the regulation of the cardiovascular system. Major conclusions are that (1) the monosynaptic connection of the sino aortal area with some structures of the bulbar level may contain relevant information on blood pressure and blood gas composition, (2) differentiated modulating influences extend from the cerebellum to the bulbar level, and (3) complex correlations of local metabolic and central reflex mechanisms operate during acute hypoxic hypoxia. S. D.

A78-46453 # Modulation of autonomic correlates of emotional stress and adaptive responses (Modulatsiya vegetativnykh korreliatov emotsional'nogo stressa i adaptatsionnykh reaktsii) A. V. Val'dman and O. S. Medvedev (Leningradskii Meditsinskii Institut, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, May 1978, p 618-625. 11 refs. In Russian

Chronic experiments were conducted on unanesthetized cats to assess the influence of a number of tranquilizers on the autonomic correlates of emotional stress induced by interaction with dogs, as well as on the adaptive responses of the cardiovascular system during muscular activity. It is found that the character and dynamics of the cardiovascular response to psychogenic stress during cat dog confrontation are dependent on active or passive type of behavior. Tranquilizer-induced modulation of the degree of emotional stress leads to the suppression of prolonged hypertensive reactions persisting after the stress stimulus. In particular, adaptive cardiovascular responses and baroreceptor reflexes remain unchanged after tranquilizer administration. S D

A78-46454 # Dynamics of reflex reactions of arteries and veins during variation of the functional state of vasomotor centers (Dinamika reflektornykh reaktsii arterii i ven pri izmenenii funktsional'nogo sostoianiia vazomotornykh tsentrov) E G Skipina, I P Krichevskaya, Zh B Nil'dibaeva, and Z S Abisheva (Gosudarstvennyi Meditsinskii Institut, Alma-Ata, Kazakh SSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, May 1978, p 663-669. 25 refs. In Russian.

A78-46573 # Aviation ergonomics. Probability methods (Aviatsionnaia ergonomika. Veroiatnostnye metody) S K Bogachev. Moscow, Izdatel'stvo Mashinostroyeniya, 1978. 139 p. 19 refs. In Russian.

Probabilistic systems analysis of complex ergonomic environment man-machine systems is suggested to determine the temporal characteristics of the desired system control under specified utilization and quality conditions. Probability methods of evaluating such ergonomic systems are discussed for various problems related to the variability of controlled plants, taking into account the characteristics of the human operator. Attention is given to the planning of aircrew activity, the design of the working places of aircrew members, and the methodological features of experimental investigation of aircrew activity. S D

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STAR ENTRIES

N78-28050 European Space Agency, Paris (France)

VALIDATION OF A MODEL OF A HUMAN PILOT

Dominique Soulatges *In its* La Rech Aerospatiale, Bi-monthly Bull No 1977-5 (ESA-TT-459) May 1978 p 109-111 Transl into ENGLISH from La Rech Aerospatiale Bull Bimestriel (Paris), no 1977-5 Sep-Oct 1977 p 325-326 Original report in FRENCH previously announced as A78-16623

Avail NTIS HC A06/MF A01

A sequential model of a human pilot is presented which takes into account the limits of human capacity for acquiring and memorizing information and puts into operation a certain strategy of action based on knowledge of the piloted vehicle and of the desired operation. The model was tested for operation of a LEM-type vehicle, the abilities of the robot and of human pilots to perform identical tasks were compared. A suitably close similarity of performance was found. Author (ESA)

N78-28772 Oklahoma State Univ., Stillwater

PORCINE MALIGNANT HYPERTHERMIA. STUDIES ON ISOLATED MUSCLE STRIPS Ph.D Thesis

Ian Laurence Anderson 1977 104 p

Avail Univ Microfilms Order No 78-11025

The effects and interactions of halothane and caffeine are investigated. Also the antagonistic effects of dantrolene sodium on halothane and caffeine induced twitch tension and contracture responses are examined. Halothane induced marked contractures in muscle from malignant hyperthermia susceptible swine which was also more sensitive to caffeine induced contractures than normal porcine muscle. Halothane potentiated twitch tension responses in both normal and malignant hyperthermia muscle and exaggerated the delayed relaxation phase of twitch response especially in malignant hyperthermia muscle. Dantrolene sodium elevated the rheobase of malignant hyperthermia muscle fibers strength duration curve for mechanical threshold, reversed and prevented halothane potentiation of twitch tension in normal and malignant hyperthermia muscle but had no effect on halothane induced twitch relaxation delay. Dantrolene sodium also prevented and reversed halothane induced contractures in malignant hyperthermia muscle and significantly attenuated caffeine induced contractures in normal and malignant hyperthermia porcine muscle. Dissert Abstr

N78-28773 North Dakota Univ., Grand Forks

AN ANALYSIS OF NEUROMUSCULAR FUNCTION AT HYPERBARIC PRESSURES Ph.D Thesis

George Richard Athey 1977 99 p

Avail Univ Microfilms Order No 78-10310

The frog sciatic nerve-gastrocnemius muscle preparation was chosen as the classical synaptic modeling system for this study. The nerve-muscle preparation was placed in a Plexiglas bath supplied with electrodes for stimulation and recording. This Plexiglas chamber was placed in a hyperbaric pressure vessel connected by way of electrical throughputs and shielded cable to dual beam oscilloscope for display of nerve and muscle compound action potentials which were then photographed for analysis. Pressurization to 1,000 psig (69.5 ATA) with helium was accomplished at a rate of 100 psig per minute. The first series of experiments was designed to investigate the effects of pressure upon nerve-muscle functioning. The second series of experiments investigated the effects of pressure upon the action of tetraethylammonium chloride. The final series of experiments considered the effects of pressure upon neostigmine bromide. Dissert Abstr

N78-28774 California Univ., Los Angeles

HYPOXIC CONDITIONING IN KITTENS: SLEEP-WAKING STATE AND CARDIORESPIRATORY RESPONSES Ph.D. Thesis

Theodore Leslie Baker 1978 169 p

Avail Univ Microfilms Order No 78-11332

The effects of long term intermittent hypoxia were studied in 10, 20 and 40 day old kittens. Hypoxic conditioning was accomplished by placing kittens in chambers with controlled oxygen atmospheres (21%, 10% or 7% O₂) for four hours daily, for either three or eight days. During the conditioning sessions. Each minute of data was manually and computer analyzed. Manual analysis included determination of the sleep-waking state (waking, active sleep, quiet sleep, or mixed), identification of the frequency and characteristics of apneas, and general evaluation of cardiorespiratory responses to hypoxia. Computer analysis yielded minute-by-minute values for heart rate, heart rate variability. Specialized computer analyses were also performed to describe events associated with apneas, sleep-waking state patterns, and interactions between sleep-waking states and the various physiological parameters. Dissert Abstr.

N78-28775 Arizona Univ., Tucson

AVIAN HEMODYNAMIC AND HOMEOSTATIC RESPONSES FOLLOWING HIGH ENVIRONMENTAL TEMPERATURE ACCLIMATION Ph.D. Thesis

Jean Marie VanHandel-Hruska 1978 121 p

Avail Univ Microfilms Order No 78-11520

Birds, like other homeotherms, respond to high environmental temperatures by utilizing a variety of thermoregulatory mechanisms in order to maintain body temperature within the narrow range necessary for life. While these mechanisms result in successful survival during heat exposure, they also compromise other physiological functions of the avian organism. The purpose of this study was to examine the extent to which laying hens can acclimate to high environmental temperature, and the effect of this acclimation process on certain physiological functions. Dissert Abstr

N78-28776# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Chemical Systems Lab

SAMPLE RETREATMENT DUAL-CELL DETECTOR APPROACH FOR DIFFERENTIATING GROUPS OF MICROBIOLOGICAL MATERIALS BY LUMINOL CHEMILUMINESCENCE Technical Report, 1 Jan - 31 Oct. 1976

Johnnie M Albizo and William A Ambush Feb 1978 28 p refs

(AD-A053383, AD-E400130) Avail NTIS HC A03/MF A01 CSCI 15/2

A dual-cell chemiluminescence detection apparatus was devised that differentiated bacteria, tissue cells, and pollen as distinct microbiological material groups by characteristic alterations of luminol chemiluminescence responses resulting from sample pretreatment in H₂O at 25 C and 80 C for 2 and 12 minutes and in alkaline silver at 80 C for 12 minutes. The bacterial species *Serratia marcescens*, *Escherichia coli* (strain 162), and *Bacillus subtilis* spores were distinguished as a group from embryonated egg, mouse fibroblasts, and monkey kidney cells after pretreatment in water at 80 C for 2 minutes. Pollen from combined grasses, garden weeds, and combined ragweeds was distinguished from bacteria and tissue cells after pretreatment in alkaline silver at 80 C for 12 minutes. *B. subtilis* spores were distinguished from the vegetative bacteria, *S. marcescens* and *E. coli*, after pretreatment with alkaline silver at 80 C for 12 minutes. The technique may have potential as an auxiliary tool for verifying and further characterizing bioalarms obtained with current biodetection devices. Author (GRA)

N78-28777# California Univ., Berkeley Lawrence Berkeley Lab

POTENTIAL OF ARID ZONE VEGETATION AS A SOURCE OF SUBSTRATES

J A Bascham Nov 1977 44 p refs Presented at Seminar on Microbial Conversion Systems for Food and Fodder Production

and Water Management Kuwait City Kuwait 12 Nov 1977
(Contract W-7405-eng-48)

(LBL-7214 Conf-771158-1) Avail NTIS HC A03/MF A01

Vegetation in arid zones as a source of substrates is discussed. Considered are the limitations on efficiency of conversion of solar energy to the stored chemical energy of biomass in green plants and the subsequent biochemical pathways of carbon dioxide fixation and biosynthesis as well as the potential of plants endogenous to arid zones. Finally the use of covered agriculture or controlled environmental agriculture is considered both in its present form and in terms of possible extension to the large scale production of stable crops. ERA

N78-28778 George Washington Univ Washington D C
CARDIOVASCULAR FUNCTION DURING A REACTION TIME TASK AND MENTAL ARITHMETIC Ph D Thesis

Nancy Jo Garside Davenport 1978 327 p

Avail Univ Microfilms Order No 7810144

During mental arithmetic all subjects demonstrated an increase in heart rate and cutaneous vasoconstriction. Alterations in contractility if present were accompanied by an increased venous return and increased peripheral resistance. Mental tasks it is concluded, cause cardiovascular alterations which are amenable to measurement by noninvasive procedures but the changes which are produced by these mental tasks are much smaller than those which are brought about by more direct physical stress. The reaction time sequence involved the presentation of a warning light signal at which the subject depressed a telegraph key followed by a respond light signal at which time the subject released the key as quickly as possible. During this reaction time sequence the heart rate decreased prior to the warning signal, increased following the warning signal, and decreased prior to the respond signal. The measurements of contractility did not show any change suggesting that the alteration in heart rate was mediated purely by the vagus. Dissert Abstr

N78-28779 State Univ of New York Buffalo
NORMOBARIC HYPEROXIA A NEW LOOK Ph D Thesis

Andrea Lynne Harabin 1978 131 p

Avail Univ Microfilms Order No 78-10626

The entire gas transport chain of both O₂ and CO₂ in ten O₂ breathing rabbits throughout exposure until death were studied. Particular attention was given to experimental design so that animals were maintained in as near natural conditions as possible. All variables studied were maintained until 8 to 12 hours of death then animals died showing a combination of two very different patterns, one pulmonary in origin, the other peripheral. Animals showing a predominately pulmonary pattern survived a longer exposure period and death probably results from arterial hypoxemia. The non-pulmonary trend results in severe lactic acidosis in the face of a well maintained Pa O₂ -- interpreted as peripheral hypoxia without arterial hypoxemia. Dissert Abstr

N78-28780 Florida Univ Gainesville
THE ENERGETICS OF ISOLATED CARDIAC MUSCLE Ph D Thesis

Charles Richard Lambert 1977 86 p

Avail Univ Microfilms Order No 78-10968

In order to investigate the model independent mechanical determinants of myocardial energy expenditure a respirometer was designed to study isolated papillary muscles. Feline right ventricular papillary muscles were mounted in a sealed muscle chamber and superfused with an oxygenated polyelectrolyte solution at 31 C. Muscle force was measured with a transducer. Muscle velocity was obtained by active differentiation of the length signal. The mechanical variables determined in the study included afterload or developed force, the time-tension integral or area under the force record, the peak velocity of isotonic shortening, the mean velocity of isotonic shortening, the distance of muscle shortening and the integral of the contraction portion of the velocity-length phase plane trajectory. Dissert Abstr

N78-28781# Army Research Inst of Environmental Medicine
Natick, Mass

THE NATURE OF THE PERCEPTION OF EFFORT AT SEA LEVEL AND HIGH ALTITUDE

Donald H Horstman Richard Weiskopf and Summer Robinson
16 Dec 1977 24 p refs

(DA Proj 3E1-61102-BS-08)

(AD-A051274 USARIEM-M-9/78)

Avail NTIS

HC A02/MF A01 CSCL 05/10

This study compared the Rating of Perceived Exertion (RPE) and selected physiological measures during both short term and prolonged work of equal relative intensities (i.e. % VO₂ max) at 4300 m to those at sea level. Ss (N = 20) performed bicycle work at supramaximal intensities for six minutes each at 60, 80 and 95% VO₂ max and to exhaustion at 85% VO₂ max. At 4300 m VO₂ max was reduced 19%, while V sub E max and R max increased 17 and 8% respectively. HR max and RPE max was unchanged. For any given relative work intensity VO₂ and absolute work intensity were of course reduced while V sub E was about 12% and R about 7% greater at 4300m. Again HR was unchanged. At 4300 m RPE at the lower intensities and early during prolonged work were significantly less than at sea level. These differences were reduced and finally eliminated as work intensity increased toward maximal or as prolonged work continued to exhaustion. Endurance time to exhaustion at 4300 m was not different from that at sea level. To account for the perceptual differences between work at 4300 m and sea level we proposed that RPE was a positively accelerating power function of central influences (tachycardia tachypnea dyspnea) and either a linear or positively decelerating power function of local influences (muscular strain). GRA

N78-28782# Army Research Inst of Environmental Medicine,
Natick, Mass

PERCEPTION OF EFFORT DURING CONSTANT WORK TO SELF-IMPOSED EXHAUSTION

Donald H Horstman, William P Morgan Allen Cymerman and James Stokes 22 Dec 1977 27 p refs

(AD-A051275 USARIEM-M-10/78)

Avail NTIS

HC A03/MF A01 CSCL 05/10

This study describes the pattern of change in effort sense and the value of this pattern in predicting work end point at relatively high work intensity (80% VO₂ max). Patterns of change of various physiological functions were also observed. Two modes of work (walking and running) were compared to ascertain generalizability of results. Subjects were 26 healthy male volunteers. Time to exhaustion (ET) did not differ between walking and running. As work continued during both tasks significant increases of V(E)/VO₂, V(E)/CO₂ and HR and a significant decrease of ET(CO₂) were observed while VO₂ and R remained fairly constant. VO₂ and V(E) during the run were about 5% greater than during the walk. Ratings of perceived exertion (RPE) from the Borg Scale were identical for both conditions, increasing in near linear fashion from a value of 12.9 at 25% of total work time to 18.9 at exhaustion. RPE obtained at 25 and 50% ET were extrapolated to time of exhaustion, the point of intercept corresponded to RPE for maximal work. At exhaustion Ss rated perception of respiratory exertion for the walk as less than that for the run. Perception of leg exertion was not different for the 2 conditions. Plasma lactate, epinephrine and norepinephrine concentrations following exercise did not differ between the 2 conditions. It is concluded that with the exception of VO₂ and some ventilatory parameters, walking and running at the same relative work intensity resulted in comparable perceptual and physiological responses. Psychophysical judgments made early during work were found to be reasonably accurate predictors of exhaustion time. GRA

N78-28783# Wisconsin Univ Madison
PULMONARY ADAPTATION TO HIGH ALTITUDE Annual
Summary Report, 1 Feb - 18 Nov 1977

Jerome A Dempsey 18 Nov 1977 9 p

(Contract DAMD17-77-C-7006, DA Proj 3E1-61102-BS-08)
(AD-A049857) Avail NTIS HC A02/MF A01 CSCL 06/16

This project is aimed at two closely related problems concerning man's adaptation to high altitude hypoxia: (1) the mechanisms which regulate the ionic composition of brain intra-

and extra-cellular fluid ICF/ECF in long-term hypoxia, and (2) the role these regulatory factors play in mediating ventilatory acclimatization to hypoxia. In studies of brain ECF in hypoxia the writer has determined the regulation of CSF HC03(-) movement between plasma and CSF described the effects of hypoxia on brain P sub CO₂ gradients described the ventilatory response of the awake rat to steady-state ventricular-cisternal perfusion of various (H⁺) and -in man- has shown that the time-course of ventilatory 'de-acclimatization' from chronic hypoxia is not explained by changes in CSF (H⁺). Secondly, he has developed techniques for the study of brain intra-cellular pH and cerebral metabolism in dogs. Thirdly, he is well underway in his studies of brain neurotransmitters in hypoxia. That is assays have been developed control data has been obtained in many rats the time-course of ventilatory acclimatization to chronic hypoxia in the awake rat has been described and he has completed initial studies of the affect of specific neurotransmitter blockade on the control of breathing in the awake animal. GRA

N78-28784# Ohio State Univ Research Foundation, Columbus Dept of Aeronautical and Astronautical Engineering
CARDIOVASCULAR, RENAL AND RESPIRATORY EFFECTS OF HIGH INTENSITY, INTERMEDIATE DURATION, LOW FREQUENCY VIBRATION Final Report, 1 Jun 1973 - 30 Jun 1977

Robert M Nerem and Robert L Hamlin Sep 1977 31 p refs
(Grant AF-AFOSR-2526-73)
(AD-A050158 AFOSR-78-0074TR) Avail NTIS
HC A03/MF A01 CSCL 06/19

The results of a research program on the influence of high intensity intermediate duration low-frequency wholebody vibration on the cardiovascular system are described. Areas of activity have included the study of in vivo transendothelial albumin transport in vitro transendothelial cholesterol transport in the presence of oscillatory flow conditions regional blood flow distribution aortic pressure and velocity wave forms (this has included the development of a pulsed ultrasonic Doppler velocimeter for noninvasive flow measurements) and aortic lipid deposition. In these studies the more subtle aspects of the effect of low frequency wholebody vibration have been examined from the viewpoint of relationships that may exist between the physiological and fluid mechanical aspects of cardiovascular phenomena. GRA

N78-28785# Letterman Army Inst of Research, San Francisco, Calif

THE EFFECTS OF ABRUPT ALTITUDE EXPOSURE (4300 m) UPON THE METABOLISM OF GLUCOSE-14 C-UL IN MAN

Herman L Johnson, C Frank Consolazio, Raymond F Burk, Ted A Daws, and Edward G Lufkin Oct 1978 35 p refs
(DA Proj 3A0-62110-A-827)
(AD-A051764 LAIR-44) Avail NTIS HC A03/MF A01 CSCL 06/1

The catabolism of infused C14-glucose in sea level natives was compared during initial altitude exposure and at sea level. An increased disappearance of plasma radioactive glucose in two studies and an increased production of C14O₂(2) in the second study were observed. Fasting plasma glucose levels decreased with increased duration of altitude exposure. Altitude exposure enhanced glucagon-mediated hyperglycemia. A shorter duration of hyperglycemia and reduced glucose levels after glucagon would suggest a depletion of liver glycogen stores in the 40-hour exposed men. Plasma levels of growth hormone were increased 6-10 fold during the first four hours at 4,300 meters. Insulin levels were increased after glucagon infusion in both altitude-exposed men and control men concomitant with increased plasma glucose values although the increases were not significantly correlated. These data indicate that glucose catabolism was enhanced during initial altitude exposure with an increased requirement for carbohydrates. Author (GRA)

N78-28786# Franklin Inst Research Labs Philadelphia, Pa Biomedical Group

BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, VOLUME 2, NO. 3, MARCH 1978

Quarterly Report, Dec 1977 - Mar 1978

Bruce H Kleinstein and Elena P Saboe Mar 1978 89 p
Sponsored by the Navy
(Contract TP-7AC024)
(AD-A052779 FIRL-80G-C4735-01) Avail NTIS
HC A05/MF A01 CSCL 06/18

This quarterly digest presents current awareness information on the biological effects of nonionizing electromagnetic radiation (microwave and radiofrequency) in the range of 0 Hz to 100 GHz. The effects of magnetic and electric fields (static and alternating) are also covered. Each issue contains abstracts of English and foreign current literature, summaries of ongoing research investigations, news items, and a directory of meeting and conferences. Author (GRA)

N78-28787# California Inst of Tech, Pasadena Graduate Aeronautical Labs

ON THE MECHANICAL PROPERTIES OF THE HUMAN INTERVERTEBRAL DISC Interim Report, Nov 1976 - Jan. 1978

N D Panagiotacopoulos, R Bloch W G Knauss P Harvey and M Patzakis Jan 1978 172 p refs
(Grant AF-AFOSR-3139-77 AF Proj 2312)
(AD-A053036 AFOSR-78-0054TR) Avail NTIS
HC A08/MF A01 CSCL 06/16

The human intervertebral disc is a highly inhomogeneous fiber composite pressure vessel. Interest in the mechanical properties of the disc started from a desire to develop a non-invasive diagnostic technique to assess disc damage based on X-ray and computer-aided image enhancement. These would be important in gaging the X-ray detected deformations of the disc under various loads. The water content of the disc material was found to dominate its mechanical behavior. From a study of three-layer specimens, several important aspects of the mechanical properties were established. First the relaxation behavior is very sensitive to moisture content. Second, water diffuses slowly in the layers. The water apparently acts similar to a solvent in a polymer effecting a change in the relaxation times. Increasing water content caused a shortening of relaxation times drying the opposite effect. Data covering a wide spectrum of relaxation times are presented that include all time scales experienced by the human body. This mechanical characterization provides an estimate of how discs respond to different rates of deformation and loading conditions. The incidence of disc problems with advancing age is explained in terms of the decrease in the moisture content of the disc along with possible changes in the nature of its mucopolysaccharides. Author (GRA)

N78-28788# Army Research Inst of Environmental Medicine, Natick, Mass

PREDICTION OF HUMAN HEAT TOLERANCE

Ralph F Goldman Jul 1977 30 p refs
(AD-A051276 USARIEM-M-19/77) Avail NTIS
HC A03/MF A01 CSCL 06/19

Human tolerance to heat exposure is limited by body heat storage as the body is unable to eliminate all the heat it produces and/or receives from the environment, and by the physiologic consequences of such storage. Heat storage of about 80 kcal represents the voluntary heat tolerance limit at which an average fit, 70 kg man usually decides he is not willing to work much longer in the heat, and increase of 160 kcal in his heat content is associated with a 50% risk of heat exhaustion collapse. As the difference between skin and air temperatures decreases a demand for evaporative cooling in the heat is imposed by the interplay of 3 factors: (1) the metabolic heat production, (2) the effective solar heat load, and (3) the radiative and convective heat exchange through the clothing insulation. This demand must be greater than the maximum evaporative cooling allowed by 3 other factors, the body's maximum sustainable sweat production (about 1L/hr approximately = to 675 Watts of cooling power), the limit to sweat evaporation imposed by clothing moisture permeability and thickness, and the difference between the vapor pressure of sweat at the skin surface and the ambient vapor pressure. GRA

N78-28789# Aerospace Medical Research Labs, Wright-Patterson AFB, Ohio
THE F/FB-111 ESCAPE INJURY MECHANISM ASSESSMENT Report, Oct 1967 - Jun 1977
 Leon E Kazarian Oct 1977 57 p refs
 (AD-A052337, AMRL-TR-77-60) Avail NTIS
 HC A04/MF A01 CSDL 06/5

All F/FB-111 ejections, for the period October 1967 to June 1977, have been reviewed from an orthopedic biomechanical point of view. A suggested radiographic method for identifying and classifying the unique spinal injury patterns in the F/FB-111 is presented. A type of fracture due to hyperextension of the upper thoracic spine, previously unidentified in the clinical and operational environment and having clinically unfamiliar features is described. F/FB-111 spinal injuries have been classed as (a) hyperextension injuries, (b) hyperflexion injuries, and (c) combination hyperextension/hyperflexion injuries. Hyperextension injuries are due to the direction of force application of the powered inertia reel, and they occur during the powered inertia reel retraction phase of the ejection sequence. Hyperflexion injuries are due to the ineffectiveness of the upper torso harness and they occur following ground landing impact. Combination injuries (hyperextension/hyperflexion) are common. The mechanism of spinal injury in most aircrewmembers is best understood and most often diagnosed by a combination of careful aircrew questioning, clinical history, and thorough roentgenographic assessment. The operational, clinical, and roentgenographic features should be complementary. A new technical order has been incorporated into the F/FB-111 emergency escape procedures. The severity and frequency of hyperflexion injuries have been reduced. The design deficiency in the configuration of the support and restraint system has been identified with the result that corrective action has been initiated. GRA

N78-28790# Naval Aerospace Medical Research Lab, Pensacola, Fla.
MOTION SICKNESS SUSCEPTIBILITY: A RETROSPECTIVE COMPARISON OF LABORATORY TESTS. Interim Report
 J Lentz and Fred E Guedry Jr 13 Dec 1977 30 p refs
 (AD-A053161, NAMRL-1244) Avail NTIS HC A03/MF A01
 CSDL 06/16

A test battery designed primarily to assess vestibular function has been used for several years to evaluate individuals referred to our laboratory. Because some of the test conditions have proved to be nauseogenic to some individuals, methods of assessing disturbance during these procedures have been used to pursue a second goal, viz., the estimation of motion sickness susceptibility. This report, which focuses on the latter goal, is a retrospective comparison of results on three tests obtained from two groups of subjects, one of which was a group of Navy and Marine aviation personnel who had suffered multiple attacks of airsickness. Results from three laboratory tests of motion sickness susceptibility indicated that there are substantial differences between the airsick group and the unselected comparison group on observer ratings and individual self-ratings of motion sickness symptoms. The provocative stimuli in each laboratory test as well as suggestions concerning how multiple tests may prove effective in predicting motion sickness are discussed.

Author (GRA)

N78-28791# California Univ, Berkeley, Lawrence Berkeley Lab
DEDICATED MEDICAL ION ACCELERATOR DESIGN STUDY. Final Report
 Dec 1977 160 p refs. Prepared jointly by Ariz Univ, Tucson (Contract W-7405-eng-48, Grant CA-17801)
 (LBL-7230, TID-4500-R66) Avail NTIS HC A08/MF A01

Based on efforts on the current consensus regarding medical requirements, the resulting demands on accelerator and beam delivery systems were analyzed and existing accelerator technology was reviewed to evaluate the feasibility of meeting these demands. This general analysis was augmented and verified by preparing detailed preliminary designs for sources of therapeutic beams of neutrons, protons, and heavy ions. It is indicated that circular accelerators are the most desirable and economical solutions for such sources. Synchrotrons are clearly superior for

beams of helium and heavier ions, while synchrotrons and cyclotrons seem equally well suited for protons although they have different strengths and weaknesses. ERA

N78-28792# Rochester Univ., N.Y. School of Medicine and Dentistry
HEALTH AND SAFETY OF HIGH VOLTAGE TRANSMISSION LINES
 S M Michaelson 1977 33 p refs. Presented at the Workshop on 765 kV Transmission, Cooperstown, N.Y., 6 Oct 1977 (Contract EY-76-C-02-3490)
 (UR-3490-1255, Conf-7710123) Avail NTIS
 HC A03/MF A01

Sufficient scientific data are currently available upon which to make an accurate judgment concerning the health, safety, and general biological environmental effects of high voltage transmission lines. There is no demonstrable biological effect which may be hazardous to health or safety or to the general biological environment as a result of the presence of electric and magnetic fields from high voltage transmission lines. Results are summarized from studies on genetic effects, effects on fertility, growth, and development of rats and chicks, serum triglycerides, and circadian rhythms of experimental animals. ERA

N78-28793# Advisory Group for Aerospace Research and Development, Paris (France)
FIFTH ADVANCED OPERATIONAL AVIATION MEDICINE COURSE
 G F Perdriel, ed Jun 1978 83 p. Course held at L'Ecole d'Application du Service de Sante pour l'Armee de l'Air, Paris, 12-23 Sep 1977
 (AGARD-R-666, ISBN-92-335-1287-1) Avail NTIS
 HC A05/MF A01

Procedures in ophthalmology and oto-rhino-laryngology for selecting flying personnel are discussed.

N78-28794# Advisory Group for Aerospace Research and Development, Paris (France)
COLOR VISION IN AVIATION
 J P Chevaleraud (Service Ophtalmologie, CPEMPN, Paris) In its 5th Advanced Operational Aviation Med Course Jun 1978 p 1-6
 Avail NTIS HC A05/MF A01

The role of color perception in all phases of aeronautics is outlined with emphasis on the safe operation of the flight vehicle. Systematic detection of color vision abnormalities in flight personnel candidates is recommended. Various methods used to detect dyschromatopsias are briefly described. J M S

N78-28795# Advisory Group for Aerospace Research and Development, Paris (France)
VISION AT LOW LUMINANCE LEVELS IN AVIATION
 J P Chevaleraud (Service Ophtalmologie, CPEMPN, Paris) In its 5th Advanced Operational Aviation Med Course Jun 1978 p 7-11
 Avail NTIS HC A05/MF A01

Low luminous vision in aeronautics, on the ground as well as in flight, is discussed in terms of pilot selection. Preadaptation and administration of medicines to improve performance are briefly assessed. J M S

N78-28796# Advisory Group for Aerospace Research and Development, Paris (France)
GLARE AND ITS ADVERSE CONSEQUENCES IN AVIATION
 J P Chevaleraud (Service Ophtalmologie, CPEMPN, Paris) In its 5th Advanced Operational Aviation Med Course Jun 1978 p 13-16
 Avail NTIS HC A05/MF A01

The effects of glare in the aeronautical environment are discussed. Sensory disturbances, deterioration of the optical image, and psychological disturbances are considered along with individual variations in the resistance to glare and in recovery of visual acuity after exposure. Selection of flight personnel as a

function of sensitivity to glare and systematic checking at each follow-up medical examination is recommended. Methods to improve recovery and protective devices are described. JMS

N78-28797# Advisory Group for Aerospace Research and Development Paris (France)

DEPTH VISION IN AVIATION

P J Manent (Service Ophtalmologie, Hospital d'Instruction des Armees D Larrey, Versailles France) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 17-22

Avail NTIS HC A05/MF A01

The significance of depth perception in aviation is discussed for the following operations: landing, in flight, ground maneuvers--taxiing, weapon firing and parachute jumping. Monocular and binocular factors involved in depth perception are described along with methods of measurement in flight personnel to predict visual performance. Extrinsic and intrinsic factors affecting depth vision are considered including ground configurations at low altitude, speed, light environment, sensorimotor, fatigue, and air sickness. JMS

N78-28798# Advisory Group for Aerospace Research and Development Paris (France)

VISUAL PROBLEMS RAISED BY LOW ALTITUDE HIGH SPEED FLIGHT

P J Manent (Service Ophtalmologie, Hospital d'Instruction des Armees D Larrey, Versailles France) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 23-28

Avail NTIS HC A05/MF A01

Visual problems associated with visual flight rule (VFR) reconnaissance or photographic missions or bombing missions are discussed. Physical, physiological and psychological stresses of low altitude high speed flight which affect vision by modifying the visual information and the visual performance and by disturbing the visual function are considered. Means designed to ensure an optimal man-machine interaction, filling the mission requirements and following safety rules are outlined. Pilot selection, periodic check ups, pilot training, protective devices, and human factors engineering are among the factors included. JMS

N78-28799# Advisory Group for Aerospace Research and Development Paris (France)

THE CONTRIBUTION OF ELECTROPHYSIOLOGY

J P Chevaleraud (Service Ophtalmologie CPEMPN, Paris) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 29-34

Avail NTIS HC A05/MF A01

Visual electrophysiological examinations are discussed in relation to the selection and medical surveillance of flight personnel. The diagnostic and prognostic value of examinations is cited. It is stated that electrophysiological examinations are objective and provide information that is easily documented. JMS

N78-28800# Advisory Group for Aerospace Research and Development Paris (France)

AUDITORY INFORMATION OF FLYING PERSONNEL: ANATOMICAL AND PHYSIOLOGICAL BASIS

L R Bondes (Service Oto-rhino-laryngologie, Hospital d'Instruction des Armees D Larrey, Versailles, France) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 35-44

Avail NTIS HC A05/MF A01

An anatomical review of the auditory system is presented along with a study of physiological acoustics. An analysis of the physiology of hearing is included. FOS

N78-28801# Advisory Group for Aerospace Research and Development Paris (France)

AVIATOR HEARING LOSS

P Blanc (Service O.R.L., CPEMPN Paris) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 45-46

Avail NTIS HC A05/MF A01

Hearing loss in flying personnel is discussed in terms of frequencies. FOS

N78-28802# Advisory Group for Aerospace Research and Development Paris (France)

PSYCHOPATHOLOGY IN EQUILIBRATION IN AEROSPACE MEDICINE

L R Bondes (Service Oto-rhino-laryngologie, Hospital d'Instruction des Armees D Larrey Versailles France) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 47-58

Avail NTIS HC A05/MF A01

Physiological aspects of equilibrium are discussed in terms of induced reflex responses. The physiopathology of equilibrium in flight is described. FOS

N78-28803# Advisory Group for Aerospace Research and Development Paris (France)

NEW ASPECTS OF BAROTRAUMA IN O.R.L.

L R Bondes (Service Oto-rhino-laryngologie, Hospital d'Instruction des Armees D Larrey Versailles France) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 59-66

Avail NTIS HC A05/MF A01

The conditions for atmospheric variations in man are reviewed along with the physiology of pressure changes in the ear. The sinus ventilation mechanism is described. FOS

N78-28804# Advisory Group for Aerospace Research and Development, Paris (France)

NOSE PATHOLOGY OF FLYING PERSONNEL

P Blanc (Service Oto-rhino-laryngologie CPEMPN, Paris) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 67-70

Avail NTIS HC A05/MF A01

Techniques for the practical examination of the nasal cavity, sinuses and Eustachian tubes are discussed along with chronic nasal affections due to infections or allergies. FOS

N78-28805# Advisory Group for Aerospace Research and Development Paris (France)

PRACTICAL PROBLEMS RAISED BY OTO-RHINO-LARYNGOLOGY STANDARDS

P Blanc (Service Oto-rhino-laryngologie, CPEMPN, Paris) *In its* 5th Advanced Operational Aviation Med Course Jun 1978 p 71-74

Avail NTIS HC A05/MF A01

Otoscope and cochlear problems are studied in terms of clinical and functional examinations. FOS

N78-28806# Civil Aeromedical Inst Oklahoma City, Okla
COMPARISON OF THE VISUAL PERCEPTION OF A RUNWAY MODEL IN PILOTS AND NONPILOTS DURING SIMULATED NIGHT LANDING APPROACH

Henry W Mertens Mar 1978 24 p refs

(AD-A054450 FAA-AM-78-15)

HC A03/MF A01 CSCL 01/2

Avail NTIS

Relative motion parallax (a difference in rate of apparent movement of objects in the visual field) a cue that can contribute to visual judgments of glide path angle, was studied for its effect on the nighttime approach problem. Pilots and nonpilots adjusted the slant of a model runway to make it appear horizontal under nighttime conditions on dynamic trials as the model approached them and on static trials with the model stationary. In a second experiment pilots and nonpilots performed the same task in dynamic trials while viewing the model in a dark field as before, and while viewing the model within a window which provided a stable visual frame of reference. Pilots also made supplementary judgments in which they verbally estimated magnitude of simulated approach angle in degrees or adjusted

the model to produce a 3 deg approach angle. Neither flying experience nor a visual frame of reference enhanced sensitivity to relative motion parallax. However, errors in horizontal adjustments were smaller in pilots indicating that flying experience enhances other cues in the runway image. G G

N78-28807* Life Systems Inc., Cleveland Ohio
ADVANCED INSTRUMENTATION CONCEPTS FOR ENVIRONMENTAL CONTROL SUBSYSTEMS Final Report, Jul 1978 - Jun 1978
 P Y Yang, F H Schubert, J R Gyorki, and R A Wynveen
 Jun 1978 59 p refs
 (Contract NAS2-9251)
 (NASA-CR-152100 ER-309-6) Avail NTIS HC A04/MF A01 CSCL 05H

Design evaluation and demonstration of advanced instrumentation concepts for improving performance of manned spacecraft environmental control and life support systems were successfully completed. Concepts to aid maintenance following fault detection and isolation were defined. A computer-guided fault correction instruction program was developed and demonstrated in a packaged unit which also contains the operator/system interface. G G

N78-28808* Wayne State Univ., Detroit, Mich. Dept of Industrial Engineering and Operations Research
HUMAN FACTORS REQUIREMENTS FOR FINGERTIP REACH CONTROLS Final Report, Jul 1975 - Aug 1977
 R R Mourant, E Moussa-Hamouda and J M Howard
 Sep 1977 123 p
 (Contract DOT-HS-5-01192)
 (PB-278811/5 DOT-HS-803267) Avail NTIS HC A06/MF A01 CSCL 13F

A project was instituted to develop human factors recommendations for fingertip controls. Interviews were conducted with 405 drivers of cars equipped with fingertip reach controls. The study indicated that performance on stalk mounted control functions was faster and required less direct looks than performance on dash mounted functions. It was recommended that the turn signal, headlight beam selector and flash-to-pass controls be located on one left stalk. It was also recommended that the wiper on/off, wiper speed and washer controls be located to the left of the driver at fingertip reach, and if stalk mounted on the same stalk. It was suggested that future research be conducted on assessing the potential of putting additional controls at fingertip reach. GRA

N78-28809* Air Force Human Resources Lab., Brooks AFB, Tex
PERFORMANCE MEASUREMENT OF MAINTENANCE
 John P Foley Jr. Dec 1977 30 p refs. Presented at the Symp on Productivity Enhancement Personnel Performance Assessment in Navy Systems 12-14 Oct 1977
 (AF Proj 1710)
 (AD-A053475, AFHRL-TR-77-76) Avail NTIS HC A03/MF A01 CSCL 05/9

This paper discusses the status of performance measurement PM for maintenance. During and after World War II both Navy and Air Force maintenance training programs made extensive use of formal job task performance tests. But for economy reasons these tests were later abandoned in favor of paper-and-pencil theory and job knowledge tests. Considering the results of later research, these actions were most unfortunate. This research has indicated that such paper-and-pencil tests do not indicate how well individuals can perform the tasks of their jobs. Even though PM were used extensively during and after World War II there have been few systematic research and development R/D efforts concerning the refinement of PM for maintenance. This paper briefly describes the AFHRL R/D efforts for PM which have given due consideration to the man-machine interface. The rather promising results of efforts to develop symbolic substitutes for PM are also presented. In addition, several problems concerning the research, development and implementation of PM are

discussed. The paper ends with proposals for future R/D efforts based on what has already been accomplished. Author (GRA)

N78-28810* Army Aeromedical Research Lab, Fort Rucker Ala
PHYSIOLOGICAL PARAMETERS ASSOCIATED WITH EXTENDED HELICOPTER FLIGHT MISSIONS: AN ASSESSMENT OF PUPILLOGRAPHIC DATA Final Report
 David B Anderson and Wun C Chiou
 Sep 1977 22 p refs
 (DA Proj 3A1-61102-B-71P)
 (AD-A052771, USAARL-77-21) Avail NTIS HC A02/MF A01 CSCL 06/16

Six Army aviators served as subjects in a study of various psychological and physiological parameters associated with extended helicopter flight missions. This report presents the results of the initial pupillographic data collected in this study as well as the problems encountered and the recommended solutions. It was shown that the waveform characteristics of the pupillary reflex response to light were irregular. Furthermore the blinking frequency increased and the pupillary amplitude varied as a function of loaded flight task. Results also revealed that the average pupillary diameter was smaller in the morning than in the evening. This report recommends the future use of pupillography in which an evaluation of pilot alertness is needed. Author (GRA)

N78-28811* Naval Research Lab., Washington D C
EVALUATION OF AN ELECTROCHEMICAL DETECTOR FOR TRACE CONCENTRATIONS OF HYDRAZINE COMPOUNDS IN AIR Final Report
 R A Saunders, J J DeCordo, B J Stammerjohn and R J Kautter
 13 Apr 1978 35 p refs
 (AD-A054636 AD-E000156 NRL-8199) Avail NTIS HC A03/MF A01 CSCL 07/1

Large quantities of nitrogen tetroxide and hydrazine compounds will be used in space shuttle operations. These materials are toxic and the nearby environment must be monitored for escaped fuels at concentrations of a few parts per billion. Based on an analytical method prototype portable monitors have been built and evaluated. The instruments meet design criteria and should be satisfactory for NASA's intended purpose. GRA

N78-28812* National Technical Information Service, Springfield, Va
PROTECTIVE CLOTHING PART 1 ARCTIC AND TROPICAL ENVIRONMENTS: A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Apr 1978
 Mary E Young
 Apr 1978 119 p refs. Supersedes NTIS/PS-77/0318, NTIS/PS-76/0267
 (NTIS/PS-78/0371/1 NTIS/PS-77/0318, NTIS/PS-76/0267)
 Avail NTIS HC \$28 00/MF \$28 00 CSCL 06Q

Reports on clothing for environmental protection in extreme climates are cited including reports on especially developed fabrics and textiles, insulating methods, physiological and psychological responses of users, mobility and dexterity of wearers, care of specialized clothing and human factors involved. (This updated bibliography contains 114 abstracts, 15 of which are new entries to the previous edition.) Author

N78-28813* National Technical Information Service, Springfield, Va
PROTECTIVE CLOTHING PART 2 FIRE AND RADIATION ENVIRONMENTS: A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Apr 1978
 Mary E Young
 Apr 1978 101 p. Supersedes NTIS/PS-77/0319, NTIS/PS-76/0268
 (NTIS/PS-78/0372/9, NTIS/PS-77/0319, NTIS/PS-76/0268)
 Avail NTIS HC \$28 00/MF \$28 00 CSCL 06Q

Research on clothing and equipment for maximum protection while fighting fires and in radiation conditions is described in the reports abstracts. Treatment of fibers and textiles, design of clothing, testing for physiological tolerances, methods of decontamination after exposure and equipment acceptability are topics included. (This updated bibliography contains 96 abstracts, 12 of which are new entries to the previous edition.) GRA

N78-28814# National Technical Information Service Springfield Va

PROTECTIVE CLOTHING PART 3 SURVIVAL AIRCRAFT, AND COMBAT ENVIRONMENTS A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Apr 1978

Mary E Young Apr 1978 198 p Supersedes NTIS/PS-77/0320 NTIS/PS-76/0269
(NTIS/PS-78/0373/7 NTIS/PS-77/0320 NTIS/PS-76/0269)
Avail NTIS HC \$28 00/MF \$28 00 CSDL 06Q

The bibliography cites reports on design testing and evaluation of protective apparel for pilots in various conditions of climate and gravity for military personnel in combat conditions for persons in special circumstances of exposure and survival such as the ocean environment and for other aviation personnel (This updated bibliography contains 193 abstracts 43 of which are new entries to the previous edition) GRA

N78-28815# National Technical Information Service Springfield, Va

PROTECTIVE CLOTHING PART 4 INDUSTRIAL ENVIRONMENTS A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Apr 1978

Mary E Young Apr 1978 151 p Supersedes NTIS/PS-77/0321 NTIS/PS-76/0270
(NTIS/PS-78/0374/5, NTIS/PS-77/0321 NTIS/PS-76/0270)
Avail NTIS HC \$28 00/MF \$28 00 CSDL 06Q

Protective clothing for industrial atmospheres including protection from explosive materials and fuels is covered in this bibliography Cited are studies on the design testing and evaluation of boots, gloves, and helmets protection against industrial dusts and human tolerances in the industrial environment GRA

N78-29037# Joint Publications Research Service Arlington Va

TWO-DIMENSIONAL LINEAR MODELS OF TWO-LEGGED WALKING

V V Beletskiy and T S Kirsanova *In its* Transl on USSR Sci and Technol (JPRS-71512) 20 Jul 1978 p 53-68 refs
Transl into ENGLISH from Izv Akad Nauk SSSR, Mekh Tverdogo Tela (Moscow), no 4, 1976 p 51-62

Copyright Avail NTIS HC A06/MF A01

Analytical modeling of the motion of two-legged walking apparatus is described The semi-reverse method is used Solutions of the equations of motion are found in explicit analytical form on the assumption that the legs and body of the apparatus make small two-dimensional oscillations Author

N78-29723*# Battelle Columbus Labs, Ohio
SPACE LIFE SCIENCES PILOT USER DEVELOPMENT PROGRAM FOR THE MIDWEST REGION Final Report

27 Jul 1978 43 p
(Contract NAS9-15504)
(NASA-CR-151819) Avail NTIS HC A03/MF A01 CSDL 06C

The use of space for research by the life science community was promoted through a series of informal one-day seminars with personal follow-up as circumstances dictated The programs were planned to (1) describe the space shuttle vehicle and some of its intended uses (2) discuss problems of manned space flight (3) stimulate ideas for biological research in space, (4) discuss costs and potential for industrial and, government sponsorship and (5) show the researcher or corporate planner how to become an active participant in life sciences research in space An outline of seminar topics is included along with a description of the seminar organization and lists of participants and materials used A R H

N78-29724*# Louisville Univ Foundation Inc Ky Health Sciences Center

SUPPORT OF ASTP/KOSMOS FUNDULUS EMBRYO DEVELOPMENT EXPERIMENT Final Report, 15 Apr 1975 - 15 Aug 1977

Peter M Fuller and J Richard Keefe 1977 12 p refs
(Contract NAS9-14632)

(NASA-CR-151816) Avail NTIS HC A02/MF A01 CSDL 06C

Results from the Kosmos Biosatellite 782 flight are presented Experiments with fish hatchlings are discussed along with postflight observation and testing The preparation of fertilized eggs for the experiments is described F O S

N78-29725*# National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston Tex

METHODS FOR MICROBIOLOGICAL AND IMMUNOLOGICAL STUDIES OF SPACE FLIGHT CREWS

Gerald R Taylor ed and S N Zaloguev, ed (USSR Ministry of Health Moscow) Jul 1978 180 p refs
(NASA-TM-58185) Avail NTIS HC A09/MF A01 CSDL 06E

Systematic laboratory procedures compiled as an outgrowth of a joint U S / U S S R microbiological-immunological experiment performed during the Apollo-Soyuz Test Project space flight are presented Included are mutually compatible methods for the identification of aerobic and microaerophilic bacteria yeast and yeastlike microorganisms and filamentous fungi methods for the bacteriophage typing of *Staphylococcus aureus* and methods for determining the sensitivity of *S aureus* to antibiotics Immunological methods using blood and immunological and biochemical methods using salivary parotid fluid are also described Formulas for media and laboratory reagents used are listed

Author

N78-29726# Naval Ship Research and Development Center Bethesda, Md

BIODEGRADATION OF SHIPBOARD WASTEWATER IN COLLECTION, HOLDING, AND TRANSFER TANKS

Alexander E Lardis and Andrew T Geyer Jan 1978 85 p refs
(AD-A053643, DTNSRDC-78/041) Avail NTIS HC A05/MF A01 CSDL 13/10

Eight different waste mixtures representing shipboard holding-tank contents were incubated in test tanks under controlled conditions to determine gas-generation rates and the quantitative effects of varying specific environmental parameters Indicators of biological activity monitored in the waste mixtures included oxidation/reduction potential pH dissolved oxygen, and the concentrations of sulfate nitrate and volatile acids In addition concentrations of various gases in the tank ullage were monitored including oxygen hydrogen sulfide carbon dioxide, ethyl mercaptan methyl mercaptan carbon monoxide, methane ammonia and hydrogen cyanide Gas-generation rate constants and other relevant data were applied to the development of a gas-generation model capable of predicting the concentrations of potentially hazardous gases in shipboard holding tanks GRA

N78-29727# Naval Weapons Support Center Crane, Ind
SELF DIFFUSION IN CELLS AND TISSUES Annual Report (Final), 1 Oct 1976 - 30 Sep 1977

John E Tanner Jr 1 Oct 1977 49 p refs
(AD-A053422 NWSC/CR/RDTR-73 AR-3) Avail NTIS HC A03/MF A01 CSDL 06/3

A general treatment of time-dependent (transient) diffusion coefficients in a system of parallel planar barriers of arbitrary permeability has been performed with emphasis on the results expected for Nuclear Magnetic Resonance (NMR) pulsed-field-gradient spin-echo measurements This is the first such derivation for permeable barriers of any geometry The calculated distribution functions and diffusion coefficients are in agreement with expectations in most of the limiting cases tried, except that an unexplained dependence of the diffusion coefficients on the magnitude of the field gradient was found The application of the results to the interpretation of experimental results is discussed GRA

N78-29728# Army Cold Regions Research and Engineering Lab Hanover, N H

NEUTRALIZATION OF ORGANIC SUBSTANCES IN WASTE WATER BY PLANTS

Apr 1978 7 p Transl into ENGLISH of Mono 'Obvezvrezhivaniye Organicheskikh Veshchestv Stokhnykh vod v Rastenyakh Kapavna USSR Ministry of Amelioration and Water Utilization, All Union Scientific Research Institute for Utilization of Waste Water in Agriculture 1975 4 p (AD-A053435, CRREL-Trans-676) Avail NTIS HC A02/MF A01 CSCL 06/1

This report discusses the neutralization of organic matter in plants using a highly sensitive method of gas chromatography with a flame ionizing detector Author (GRA)

N78-29729# Virginia Univ Charlottesville Dept of Environmental Sciences

SEAGRASS LITERATURE SURVEY Final Report

Joseph C Zieman Kent M Bridges, and C Peter McRoy Jan 1978 219 p

(Contract DACW39-74-C-0170)

(AD-A054480, WES-TR-D-78-4) Avail NTIS HC A10/MF A01 CSCL 08/1

An extensive review of the literature pertaining to seagrasses was accomplished through a search of published literature and unpublished documents up to mid 1977 Broad scientific subject areas that relate to seagrasses such as anatomy, ecology morphology taxonomy and physiology were considered together with more specific factors such as substrate selectivity water quality productivity, colonization effect of physical energy (waves tidal currents sediment transport), propagation, and tolerance to disturbance The bibliography is divided into two main reference sections consisting of a bibliographic citations section and a keyword index section Also, two supplementary reference sections consisting of an author index section and a source index section appear as appendices in microfiche form Author (GRA)

N78-29730# Research Inst of National Defence Stockholm (Sweden)

INFLUENCE OF MICROWAVES WITHIN THE THERMAL INTENSITY RANGE IN MICE WEIGHT, RECTAL TEMPERATURE, RESPIRATION, TREAD MILL ACTIVITY, REACTION OF SENSES, AND LEARNING [INVERKAN AV MIKROVÅGOR INOM DET TERMISKA INTENSITETS-OMRÅDET PÅ MOESS KROPPSVIKT, REKTALTEMPERATUR, ANDNING, LOEPHJULSAKTIVITET, SINNESREAKTION OCH INLÄRNING]

C O Criborn Oct 1977 47 p refs In SWEDISH (FOA-C-54018-H2/H6) Avail NTIS HC A03/MF A01

Investigations show that mice exposed to microwave radiation of 2450 MHz 100 mW/sq cm for 3 to 6 min change respiration activity and reaction of senses during exposure Body temperature increases from 37 to 39 C during exposure Reaction of senses is cut out after approx 90 sec followed by hyperventilation which can cause death in the animals if the exposure is not discontinued within 5 to 6 min The first 3 days after exposure no negative influence on the tread mill activity or learning was observed Long term studies of changes in tread mill activity and hemoglobin value showed that a diminution of these parameters occur approx one week after radiation exposure which is probably due to injuries of the blood producing organs

Author (ESA)

N78-29731# Research Inst of National Defence, Sundbyberg (Sweden)

MILK SECRETION OF Zn-65 IN THE GOAT AFTER ORAL INTAKE OF RADIOZINC

Lars Ekman (Roy Vet Coll of Swed Stockholm) and Bernt E V Jones (Roy Vet Coll of Swed Stockholm) Nov 1977 16 p refs

(FOA-C-40069-A3) Avail NTIS HC A02/MF A01

The metabolism of Zn-65 was studied in seven lactating goats after the administration of 100 to 200 µCi Zn65Cl solution In blood and milk Zn-65 was detected 4 hours after the administration of the radio-nuclide Maximum blood concentration was reached after about 24 hr and in milk after about 48 hr At this time the concentration was about 0.5% per liter plasma or milk The milk secretion of Zn-65 accumulated during 7 days varied considerably The three goats receiving 40 mg a day of dietary zinc secreted 2.7% to 5.8% of the given amount of Zn-65

and the goats receiving 200 mg of stable zinc daily secreted only 0.3% to 0.9% The accumulated urinary and fecal excretion showed less variation The four animals studied excreted less than 0.2% in the urine and 65.1% to 91.4% of the given amount in the feces The concentration of stable zinc ranged from 690 to 1070 mg per liter plasma and from 680 to 1430 mg per liter milk

Author (ESA)

N78-29732# Research Inst of National Defence Stockholm (Sweden)

METABOLISM OF 181W-LABELED SODIUM TUNGSTATE IN GOATS

Lars Ekman (Roy Vet Coll of Swed Stockholm) Horacio D Figueiras (Roy Vet Coll of Swed Stockholm) Bernt E V Jones (Roy Vet Coll of Swed Stockholm) and Susumo Myamoto (Roy Vet Coll of Swed Stockholm) Nov 1977 20 p refs (FOA-C-40070-A3) Avail NTIS HC A02/MF A01

The metabolism of 181-W labeled Na2WO4 in goats was studied because tungsten radionuclides have been detected in fallout in several countries It was found that a minor part of the ingested 181-W was absorbed in the gastrointestinal tract the main part about 95% was recovered in the feces The absorbed radiotungsten was mainly in the urine (1.8% to 3.4%) and a small amount was recovered in the milk (0.03% to 0.12%) On autopsy the largest amounts of 181-W were found in the kidneys and liver but large amounts were also found in ribs and some lymph nodes About 87% was excreted in the urine 6% in feces and 3% in milk 48 hr after intravenous injection Intravenous administration was found to give 15 to 20 times higher radioactivity concentration than oral administration The data obtained suggest that radiotungsten is unlikely to be a significant environmental pollutant source for man as far as its concentration in milk and meat are concerned ESA

N78-29733# Virginia Inst of Marine Science Gloucester Point **PHYTOPLANKTON SAMPLING IN QUANTITATIVE BASELINE AND MONITORING PROGRAMS Final Special Scientific Report**

Paul E Stofan and George C Grant Feb 1978 92 p refs (Grant EPA-R-804147-01-0)

(PB-279644/9, VIMS-SSR-85 EPA-600/3-78-025) Avail NTIS HC A06/MF A01 CSCL 13B

An overview of phytoplankton sampling and analysis methods as they apply to quantitative baseline and monitoring surveys is provided A need for inclusion of a preliminary field survey of the area under investigation and of flexibility in sampling design is stressed An extensive bibliography pertinent to phytoplankton sampling and analysis is included GRA

N78-29734 George Washington Univ Washington D C **THE FREQUENCY FOLLOWING RESPONSE IN HUMANS Ph D Thesis**

Michael Stanley Gluck 1978 264 p Avail Univ Microfilms Order No 7810329

The measurement and recording of good quality responses using surface electrodes, in an ordinary electronics laboratory without electrical or acoustic shielding is demonstrated A peak in the amplitude of the response occurs near 500 Hertz Evidence is presented to show that this peak is not the result of a system artifact but rather represents a true evoked response Several possible explanations are discussed, the most likely being that the various components of the response-the neural frequency following response the cochlear microphonic and the response of the post auricular muscle-are in phase at this frequency and add to provide a local maximum in the response Different methods of measuring the response latency are discussed It is shown that some aspects of the latency as well as the response duration show a frequency dependence that is similar to that of the response amplitude Dissert Abstr

N78-29735 California Inst of Tech Pasadena **THE PROCESSING OF VELOCITY INFORMATION BY THE PURSUIT OCULOMOTOR SYSTEM Ph D Thesis**

Rick Alan Williams 1978 219 p Avail Univ Microfilms Order No 7810785

A study of human smooth pursuit eye movements was performed in order to clarify the velocity information processing

capabilities of the visual system. A set of stimuli were designed which when presented in motion to the visual system contained no position information. Thus, the velocity sensitive pursuit system was stimulated in isolation from the saccadic system which is position sensitive. The smooth eye movements which were elicited by step increases in target velocity from zero velocity were analyzed in detail by a nonlinear least squares curve fitting procedure. Eye velocity was found not to exactly match stimulus velocity, the differences being unsystematic with velocity amplitude or direction. Response latency and the duration of eye acceleration were found to vary about average values of 150 and 300 msec respectively. Dissert Abstr

**N78-29736# Siemens A G, Erlangen (West Germany)
BIOELECTRODES AS SENSORS AND AS POWER SOURCES
FOR IMPLANTABLE MEDICAL DEVICES**

Gerhard Richter Erhard Weidlich and Magdalena Wenzel Dec 1977 318 p refs In GERMAN ENGLISH summary
(BMFI-FB-1-/-44) Avail NTIS HC A14/MF A01

Two types of electrochemical power sources were developed to provide long-term energy for implantable electronic devices. (1) Biogalvanic aluminum-oxygen-cells of the shape and size of a pocket watch (volume 20 ml) have attained in vitro life periods up to 31 years. The effective life period is estimated to be 10 years. In an animal experiment a cell performed for 22 years delivering approximately 80 micro-W. (2) Biofuel cells utilize the oxidation of body glucose in the process of generating power and are therefore particularly small (volume 3 ml). The older types of cells have been under operation in vitro for over 2 years. In an animal experiment a cell of latest construction achieved 40 micro-W at a cell voltage of 575 mV. This cell had to be explanted after 140 days because of inflammation. F O S

**N78-29737# School of Aerospace Medicine Brooks AFB, Tex
ALTITUDE DECOMPRESSION SICKNESS REVIEW OF
CONCEPTS IN PRIMARY CARE**

Mark E. Speckhard Dec 1977 22 p refs
(AD-A050849, SAM-Review-4-77 SAM-TR-77-24) Avail
NTIS HC A02/MF A01 CSCL 06/19

Altitude decompression sickness (DCS) was once a major cause of incapacitation in aviators. Preventive measures including cabin pressurization and denitrogenation have markedly reduced the incidence of altitude DCS. Most flight surgeons will now see only an infrequent case. Despite limited first-hand experience the physician who cares for aviators must maintain expertise in the diagnosis and management of altitude DCS. The prognosis associated with expeditious primary care and prompt hyperbaric therapy is excellent. This paper reviews with the flight surgeon concepts in the primary care of altitude DCS. Author (GRA)

**N78-29738# IIT Research Inst Chicago, Ill
THERMAL MODEL OF LASER-INDUCED SKIN DAMAGE
COMPUTER PROGRAM OPERATOR'S MANUAL
Final Report, Sep 1976 - Apr 1977**

A. N. Takata Dec 1977 58 p
(Contract F33615-76-C-0608)
(AD-A053416, SAM-TR-77-3723) Avail NTIS
HC A04/MF A01 CSCL 06/18

A user-oriented description is given of a computer program for predicting temperature rises, irreversible damage, and degree of burns caused to skin by laser exposures. This report describes the parameters necessary to run the program and provides suggested values for the parameters. Input data are described in detail as well as the capabilities and limitations of the program. Author (GRA)

**N78-29739# School of Aerospace Medicine, Brooks AFB Tex
CORNEAL DAMAGE THRESHOLDS FOR INFRARED LASER
EXPOSURE EMPIRICAL DATA, MODEL PREDICTIONS,
AND SAFETY STANDARDS Final Report, Apr 1975 - Jun
1977**

David E. Egbert and Edward F. Maher Dec 1977 64 p refs
(AD-A049946, SAM-TR-77-29) Avail NTIS
HC A04/MF A01 CSCL 06/18

Experimental damage threshold data for corneal injury from infrared lasers are compared with thermal model predictions of temperature rise, lesion radius, and damage threshold using several damage criteria. The functional dependence of the threshold exposure upon damage end-point, damage criteria, absorption coefficient, beam radius, exposure duration, and damage site is determined. Experimental and predicted thresholds are compared to the ANSI Z136.1-1976 laser safety standard. Similar analysis with the thermal model for applications such as photokeratoplasty or corneal and lenticular spectroscopy can yield alternative approaches to either maximize or avoid thermal effects often inherent in such research. Author (GRA)

**N78-29740# Harry Diamond Labs Adelphi Md
SOLID-STATE ULTRASONIC CATHETER-TIP FLOWMETER**
Don R. Pardue and Charles L. Coleman Dec 1977 18 p refs
(DA Proj 1T1-61101-A-91A)
(AD-A050963, HDL-TM-77-38) Avail NTIS
HC A02/MF A01 CSCL 06/12

A blood flowmeter measures the difference in upstream and downstream transit times for short bursts of 10 MHz ultrasound with the two transducers required mounted in a catheter tip. This instrument can measure flow as small as 0.1 cm/s with a response time of 5 ms. A method is proposed to measure the cross-sectional area of the vessel so that the volume flow rate and the flow velocity can be determined. Author (GRA)

**N78-29741# Army Environmental Hygiene Agency Aberdeen
Proving Ground, Md
TOPICAL HAZARD EVALUATION PROGRAM OF CANDI-
DATE INSECT REPELLENT AI3-36331, US DEPARTMENT
OF AGRICULTURE PROPRIETY COMPOUND Final Report,
May 1976 - Dec 1977**

Maurice H. Weeks and Brenda J. DeSena 18 May 1978
10 p
(AD-A054216, USAEHA-51-0875-78) Avail NTIS
HC A02/MF A01 CSCL 06/6

A hazard evaluation of candidate insect repellent AI3-36331 was performed by means of laboratory studies using rats, rabbits, and guinea pigs. The technical grade compound caused mild skin irritation, but no eye irritation in rabbits, no sensitization reactions in guinea pigs, and did not demonstrate an acute ingestion hazard. GRA

**N78-29742# Oak Ridge National Lab, Tenn
HIGH RESOLUTION ULTRASONIC SCANNING OF ANIMAL
AND HUMAN TISSUE IN-VIVO Ph D Thesis - Rensselear
Polytechnic Inst**

R. L. Roswell, R. E. Goans and J. H. Cantrell Jr Aug 1977
93 p refs
(Contract W-7405-eng-26)
(ORNL-TM-5934) Avail NTIS HC A05/MF A01

Burns impose one of the most serious injuries to the skin due to the organ's function within the body system and to the body as a whole. In an effort to better deal with the burn wound by the immediate excision and grafting of third degree burns, a high resolution ultrasonic pulse-echo technique was developed for determining burn depth. The experimental subjects were Yorkshire pigs because of the histological similarity between human and porcine skin. Burn depths were readily identifiable immediately postburn with the ultrasonic techniques as were general trends concerning the burn-viable and viable-fat interfaces. The tissue characteristics, density, and acoustic attenuation effecting the impedance mismatch at the burn-viable tissue interface were investigated. The methods of fluid displacements and specific gravities yielded density values while spectrum analyses produced attenuation measurements for normal viable and burned tissue samples. ERA

**N78-29743# Medical Biological Lab RVO-TNO Rijswijk
(Netherlands)**

**THE IMPORTANCE OF THE MYOCARDIAL DEPRESSANT
FACTOR (MDF) FOR THE OCCURRENCE OF IRREVERSIBLE
SHOCK A LITERATURE STUDY**

C vanderMeer Oct 1977 26 p refs In DUTCH ENGLISH summary

(MBL-1977-5, TDCK-69911) Avail NTIS HC A03/MF A01

A literature survey on the patho-physiological importance of Myocardial Depressant Factor (MDF) in shock is presented. A critical evaluation of the data collected by Lefer Glenn and collaborators and the conclusions concerning the importance of MDF drawn by these authors from their experiments was made. It is concluded that the importance of MDF as a causative factor in irreversible shock must for the time being be considered as very doubtful. Author (ESA)

N78-29744# Research Inst of National Defence, Sundbyberg (Sweden)

TOXICOLOGICAL INVESTIGATION OF ZINC AND TITANIUM SMOKE COMPOSITIONS A LITERATURE STUDY [TOXIKOLOGISK UNDERSOEKNING AV ZINK- OCH TITANROEKSATSER EN LITTERATURSTUDIE]

Gunilla Heimbürger Dec 1977 25 p refs In SWEDISH (FOA-C-40072-H2) Avail NTIS HC A02/MF A01

The study concerned the elements contained in and produced by zinc and titanium smoke compositions. The primary products from zinc and titanium smoke compositions are ZnCl₂ and TiCl₄, respectively. These compounds are easily hydrolyzed by water. The limitation of the hydrolyze depends on air humidity. Highly corrosive chlorohydroxy zinc acids are primary products from ZnCl₂ and they gradually turn into hydrochloric acid and zinc oxychloride. TiCl₄ produces HCl and titanium oxides. No definite conclusions as to which smoke composition is least toxic can be drawn from available information. Author (ESA)

N78-29745# National Technical Information Service Springfield Va

BIOLOGICAL EFFECTS OF MICROWAVES A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Apr 1978

Elizabeth A Harrison May 1978 228 p Supersedes NTIS/PS-77/0455 NTIS/PS-76/0387 NTIS/PS-75/384 (NTIS/PS-78/0432/1 NTIS/PS-77/0455 NTIS/PS-76/0387 NTIS/PS-75/384) Avail NTIS HC \$28.00/MF \$28.00 CSCL 06R

This bibliography contains 212 abstracts. The biological effects on man and animals from exposure to microwaves are emphasized. In addition to dosages and tolerances, regulations and standards are included. GRA

N78-29746# General Accounting Office Washington D C Community and Economics Development Div

EFFORTS BY THE ENVIRONMENTAL PROTECTION AGENCY TO PROTECT THE PUBLIC FROM ENVIRONMENTAL NONIONIZING RADIATION EXPOSURES

23 Mar 1978 16 p ref (PB-279483/2 CED-78-79) Avail NTIS HC A02/MF A01 CSCL 06R

The subject of nonionizing radiation has become a national concern because the population is receiving measurable exposures to the radiation. The health effects of such exposures even at low levels are controversial. Currently there is no official U.S. environmental public health standard for exposure to nonionizing radiation sources because U.S. Research programs have not yet developed sufficient data to establish standards for microwave and other nonionizing frequencies. The Environmental Protection Agency is responsible for eliminating or reducing potentially harmful health effects by limiting exposures from radiation sources. This report discusses Agency activities to (1) evaluate the need for protection standards and (2) establish such standards where necessary. GRA

N78-29747# Nuclear Regulatory Commission Washington D C Office of Standards Development

BEIRMOD, A COMPUTER PROGRAM FOR CALCULATING THE EFFECTS OF EXPOSURE TO IONIZING RADIATION

Charles A Willis May 1978 33 p (PB-279584/7 NUREG-0444) Avail NTIS HC A03/MF A01 CSCL 06R

Use of the BEIRMOD (Biological Effects of Ionizing Radiation Models) computer program is described. The user may select (1) either the relative risk or the absolute risk model (2) either 30 years or remainder of life for the plateau duration for cancer other than leukemia (3) the exposure period and (4) the exposure rate. Output includes average life shortening (by radiation-induced cancer) percent of deaths caused by radiation and average life span reduction per person-rem. GRA

N78-29748 Japan Broadcasting Corp Tokyo Auditory and Visual Information Processing Research Group

THE APPARENT RATE OF FLICKER

Tadahiko Fukuda Nov 1977 9 p refs (NHK-Labs-Note-219) Copyright Avail Issuing Activity

Attempts were made to measure the apparent rate of successive sinusoidal flicker and to investigate its relation to such parameters as stimulus size and retinal location by matching it with a second stimulus, an audio flutter. The auditory stimulus employed as a reference was a pure tone which was frequency modulated by a sine wave. It was observed that the apparent rate of flicker was not always equal to the actual rate. The apparent rate increased approximately in direct proportion to the frequency presented when target size was small and tended to be lower than the actual rate when target size was large. The apparent rate never exceeded approximately 10 Hz regardless of the presented flicker frequency or the luminance of the target. These tendencies were observed commonly in the fovea and in the periphery of the retina. J A M

N78-29749# Arizona State Univ Tempe College of Education

VERBAL PRESCRIPTIVE RULES IN COGNITIVE PRETRAINING FOR THE VERTICAL S-A TRAINING MANEUVER Interim Report

William V Hagin Robert C Haywood and Scott S Herrington Jul 1977 43 p refs

(Grant AF-AFOSR-2900-76) (AD-A050971 TR-70615 AFOSR-78-0210TR) Avail NTIS HC A03/MF A01 CSCL 05/9

A study was conducted to determine the effectiveness of verbal prescriptive rules in cognitive pretraining for an instrument flight maneuver. Thirty male pilot trainees participated in the study. Each subject had acquired simple aircraft control skills, but was naive with respect to the experimental maneuver. The subjects were assigned to one of three treatment groups. The first group received systematically-developed rule sets covering the entire maneuver. The second was given only the simple maneuver definition but was asked to generate and record a set of rules for the maneuver. The third group was given only the maneuver definition. The effects of cognitive pretraining were assessed by having the subjects perform the maneuver in an instrument flight trainer immediately following pretraining. All three groups showed comparable achievement in learning the motor task. The results indicate that subjects who already know the component elements of a task do as well when given a simple definition of the maneuver and performance criteria as do subjects who are drilled on sets of rules for performance. Author (GRA)

N78-29750# Air Training Command Randolph AFB Tex Director of Operations Analysis

ALTERNATIVES FOR FUTURE UNDERGRADUATE PILOT TRAINING

Steven G Joseph Apr 1977 268 p refs (AD-A053374 Rept-77-1) Avail NTIS HC A12/MF A01 CSCL 01/3

The Air Training Command was requested to develop and examine alternatives for replacement of the aging T-37 along with options which provide a more economically trained graduate. This study reports the results of that examination. Training requirements for UPT (Undergraduate Pilot Training) unchanged in the future with the emphasis remaining on the acquisition of basic flying skills. A specialized pilot training system is required to effectively teach the 30 identified training requirements.

Procurement of new aircraft is required to replace the T-37 and inaugurate specialized pilot training T-38 fleet life can be extended ten years by conversion to a specialized UPT system Acquisition and life cycle costs favor a three aircraft specialized UPT system a primary aircraft replacement for the T-37 a new TTB (Tanker-Transport-Bomber) trainer and use of the T-38 as a FAIR (Fighter-Attack-Interceptor-Reconnaissance) trainer GRA

N78-29751# Research Inst of National Defence Stockholm (Sweden)
COMPARISON BETWEEN FLIGHT TEST DATA AND DATA FROM A THEORETICAL MODEL FOR THE DISCOVERY OF A GROUND TARGET FROM THE AIR [JAEMFOERELSE MELLAN DATA FRAAN ETT FLYGPROV OCH EN TEORETISK MODELL FOER UPPTAECKT AV MARKMAAL FRAAN LUFTEN]

Lars Persson and Henry Widen Aug 1977 13 p refs In SWEDISH
(FOA-C-56010-H9/H6) Avail NTIS HC A02/MF A01

Predictions made with a theoretical model for discovery and identification of ground targets from the air were compared with data from a flight test Two different methods the Q-method and the 1/5-method were used to calculate the identifying function for two cases case A implying low target contrast and infinite geometric visibility, case B high target contrast and 3 km geometric visibility Results show that both methods could well predict the average identifying distance in case A For case B this distance was overestimated by both methods Distribution of the identifying distance was well predicted in both cases with the Q-method but was underestimated with the 1/5-method Author (ESA)

N78-29752# National Technical Information Service Springfield Va
SIMULATORS IN EDUCATION AND TRAINING, VOLUME 2 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1974 - Apr 1977

Guy E Habercom Jr Apr 1978 167 p
(NTIS/PS-78/0378/6) Avail NTIS HC \$28 00/MF \$28 00 CSCL 05I

This bibliography contains 162 abstracts of reports on simulators and simulation technology in a broad range of educational and training settings Aerial ground marine and submarine operations are covered and several patents are included Procedures are cited in many fields such as radar sonar space shuttles firefighting management, sea navigation computer aided systems, and lasers GRA

N78-29753# National Technical Information Service Springfield Va
SIMULATORS IN EDUCATION AND TRAINING, VOLUME 3 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, May 1977 - Mar 1978

Guy E Habercom, Jr Apr 1978 158 p Supersedes NTIS/PS-77/0035 NTIS/PS-76/0287
(NTIS/PS-78/0379/4 NTIS/PS-77/0335 NTIS/PS-76/0287) Avail NTIS HC \$28 00/MF \$28 00 CSCL 05I

This bibliography contains 153 abstracts For abstract see N78-29752 GRA

N78-29754*# Science Applications Inc Englewood Colo
MAN-MACHINE INTERFACE ANALYSIS OF THE FLIGHT DESIGN SYSTEM

H Rudy Ramsey, Michael E Atwood and John K Willoughby 30 Jun 1978 37 p
(Contract NAS9-15535)
(NASA-CR-151812 SAI-78-089-DEN) Avail NTIS HC A03/MF A01 CSCL 05H

The objective of the current effort was to perform a broad analysis of the human factors issues involved in the design of the Flight Design System (FDS) The analysis was intended to include characteristics of the system itself, such as (1) basic structure and functional capabilities of FDS (2) user backgrounds capabilities and possible modes of use (3) FDS interactive dialogue problem solving aids (4) system data

management capabilities and to include as well such system related matters as (1) flight design team structure (2) roles of technicians (3) user training and (4) methods of evaluating system performance Wherever possible specific recommendations are made In other cases, the issues which seem most important are identified In some cases additional analyses or experiments which might provide resolution are suggested G Y

N78-29755# Arizona State Univ, Tempe Coll of Education
MEASURING PILOT PROFICIENCY ON AN INSTRUMENT TRAINING MANEUVER Interim Report

William V Hagin Scott S Herrington and Robert C Haygood Aug 1977 44 p refs
(Grant AF-AFOSR-2900-76)
(AD-A050972 TR-70820 AFOSR-78-0211TR) Avail NTIS HC A03/MF A01 CSCL 05/9

The record/playback feature of modern advanced digital simulators indicates a potential for the achievement of important methodological advances in observer training and in predetermining measurement reliability An exploratory study recently completed showed that the record/playback feature of the Advanced Simulator for Pilot Training (ASPT) could be successfully used to facilitate the development and validation of a recording form for an instrument flight training maneuver In addition this feature was successfully used to train instructor pilot observers to reliably record maneuver performances using the form These results have important research implications since they will allow a degree of control over recording objectivity and reliability not previously possible Researchers can be freed from after-the-fact correlational reliability estimations In addition innovative recording formats can be safely and efficiently developed and refined before validation in flight Author (GRA)

N78-29756# Dynamics Research Corp Wilmington Mass
INTEGRATION AND APPLICATION OF HUMAN RESOURCE TECHNOLOGIES IN WEAPON SYSTEM DESIGN Interim Report, Apr - Oct 1977

John C Goclowski William B Askren (AF Human Resources Lab Wright-Patterson AFB, Ohio) Gerard F King and Paul G Ronco Mar 1978 73 p refs
(Contract F33615-77-C-0016 AF Proj 1959)
(AD-A053681 AFHRL-TR-78-6(2)) Avail NTIS HC A04/MF A01 CSCL 05/5

The four basic activities of the coordinated human resource technology are described The first is the consolidated data base development which processes source data The second is the integrated requirements and task analysis (IRTA) which determines human resource requirements The third is ISD/JGD product development The fourth is the impact analysis which provides human resource and cost data on any specific configuration or alternative It is through this activity that CHRT may influence the selection of design maintenance operations and support alternatives GRA

N78-29757# Dynamics Research Corp Wilmington Mass
INTEGRATION AND APPLICATION OF HUMAN RESOURCE TECHNOLOGIES IN WEAPON SYSTEM DESIGN COORDINATION OF FIVE HUMAN RESOURCE TECHNOLOGIES Interim Report, Apr - Oct 1977

John C Goclowski Gerard F King Paul G Ronco and William B Askren (Advanced Systems Div Wright-Patterson AFB Ohio) Mar 1978 73 p refs
(Contract F33615-77-C-0016)
(AD-A053680 AFHRL-TR-78-6(1)) Avail NTIS HC A04/MF A01 CSCL 05/5

The five human resource technologies are defined as maintenance manpower modeling (MMM) instructional system development (ISD) job guide development (JGD) system ownership costing (SOC) and human resources in design trade-offs (HRDT) The interrelationships among the five human resource technologies are identified and a methodology to apply them throughout weapon system acquisition is developed The methodology the coordinated human resource technology (CHRT) when applied quantifies the reliability maintainability, manpower, training, and job guide documentation requirements for a weapon system and allows these factors to influence design maintenance

operations and support concepts early in acquisition CHRT
also provides a means to estimate ownership cost GRA

N78-29758# Queensborough Community College Bayside N Y
**A MULTIPARAMETER TIME DOMAIN AVERAGING MODEL
OF THE HUMAN OPERATOR** Final Report, 1 Jun - 30 Sep
1977

Nathan Chao 1 Feb 1978 48 p refs
(Grant AF-AFOSR-3350-77)
(AD-A054676, AFOSR-78-0625TR) Avail NTIS
HC A03/MF A01 CSDL 05/9

A time domain averaging model of the human operator was applied to model the operator's output for three different subjects each of whom performed compensatory tracking tasks with three different types of plants. Model parameters were optimally extracted from each single run. The correlation obtained between the model and each run was about 0.9 in all cases. In the time domain parameter extraction process, each operator's control strategy and control characteristic were found and were discussed.
Author (GRA)

N78-29759# Monosolar, Inc., Santa Monica, Calif
**IMPROVED SEMICONDUCTORS FOR PHOTOVOLTAIC
SOLAR CELLS** Quarterly Report, 15 Jul - 31 Oct 1977
30 Nov 1977 18 p refs
(DSE/2457-5 QR-5) Avail NTIS HC A02/MF A01

Electroplating doped cadmium telluride homojunctions on ITO-coated glass substrates using aqueous electrolytes at a temperature of 90 C is described. Latest cells made 90 C display very encouraging values of $V_{sub oc} = 0.5$ volts showing good junction formation. However $J_{sub sc}/A$ is still low around 9 ma/sq cm and fill factor continues to measure 0.25 to 0.3 both indicating a continuing problem either with high series resistance in the layers or at the rear contact made to the p-type layer with silver or both.
ERA

N78-29760# Los Alamos Scientific Lab., N Mex
**RESPIRATOR STUDIES FOR THE NUCLEAR REGULATORY
COMMISSION PROTECTION FACTORS FOR SUPPLIED-
AIR RESPIRATORS** Progress Report, 1 Oct 1976 - 30 Sep
1977

Alan Hack O D Bradley and Andres Trujillo Dec 1977 35 p
refs
(Contract W-7405-eng-36)
(LA-7098-PR) Avail NTIS HC A03/MF A01

The protection factors (efficiency) provided by 25 NIOSH approved supplied-air respirators were determined while the devices were worn by a panel of anthropometrically selected test subjects. The major recommendation was that demand-type respirators should neither be used nor approved.
ERA

N78-29761# Research Inst of National Defence, Stockholm
(Sweden)
**MEDICAL EVALUATION OF 2-PRESSURE SUIT USED IN
EXPLOSIVE DECOMPRESSIONS UP TO 20 000 m ALTITUDE
[MEDICINSK VAERDERING AV 2-TRYCKSDRAEKT AN-
VAEND VID EXPLOSIVA DEKOMPRESSIONER UPP TILL
20 000 m HOEJD]**

Ulf Balldin Sep 1977 17 p refs In SWEDISH
(FOA-A-59002-H3) Avail NTIS HC A02/MF A01

The so-called two-pressure suit developed in Sweden for rescue at high altitude flight was tested from various medical safety aspects. The suit permits sufficient oxygen supply at high altitude up to 70 mm Hg (9.3 kPa) overpressure respiration through counterpressure against the thorax and through a pressure 3.2 times higher in the g-trousers. Ten test persons were exposed to explosive decompressions from 9 000 to 17 500 m or to 20 000 in 0.5 sec after 1 hr oxygen respiration in a low pressure chamber. No symptoms of decompression sickness or lung bursting with gas emboli to the central nerve system were observed. Lung X-ray after the test did in no case show bursting of the lung with gas leakage from the lungs to the pleural sack, pericardium, mediastinum or the skin. Only in one case spurious intercardial gas bubbles (so-called silent bubbles

in the blood circulation) were ascertained with Doppler ultrasound in one of the test persons after explosive decompression to 20 000 m altitude.
Author (ESA)

N78-29762# National Aerospace Lab Amsterdam (Netherlands)
Space Flight Div

**PILOT WORKLOAD ANALYSIS BASED UPON IN-FLIGHT
PHYSIOLOGICAL MEASUREMENTS AND TASK ANALYSIS
METHODS**

J Smit 3 Jan 1978 9 p refs Presented at the Intern
Symp on Monitoring Behavior and Supervisory Control Berchtes-
gaden, West Ger 2 Mar 1976
(NLR-MP-76001-U) Avail NTIS HC A02/MF A01

An experimental program aimed at the analysis of pilot workload during low-level attack missions is described. In-flight physiological measures, subjective ratings and performance measures were used to estimate the demand of the penetration and weapon delivery tasks. Two self appraisal scales were administered to assess the relationship between individual physiological reaction patterns and some personality traits.
Author (ESA)

N78-29763# National Aerospace Lab Amsterdam (Netherlands)
Space Flight Div

**HUMAN CONTROL AND MONITORING-MODELS AND
EXPERIMENTS**

P H Wewerinke 3 Jan 1978 27 p refs Presented at the
12th Ann Conf on Manual Control Urbana Champaign USA
25-27 May 1976
(NLR-MP-76015-U) Avail NTIS HC A03/MF A01

The results of a theoretical and experimental program concerning human monitoring behavior are discussed. Apart from monitoring an automatic approach combined monitoring and manual flight director control was studied to determine the interference between subtasks. Simultaneous monitoring and auditory tracking was also included. The results demonstrate that the multivariable monitor model adequately describes human behavior in the tasks. A multivariable workload model was developed which agrees excellently with subjective ratings.

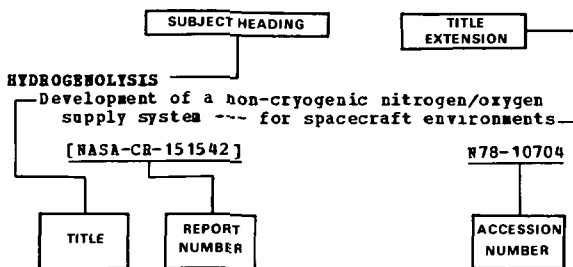
Author (ESA)

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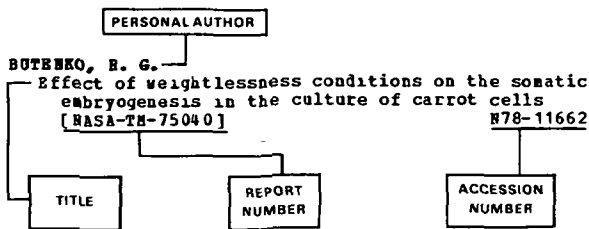
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